DOCUMENT RESUME

ED 323 104 SE 051 558

AUTHOR	Depenbusch, Joyce Harmon
TITLE	How Do We Group Wildlife? Teacher's Guide and Student Guide, Grade 5.
INSTITUTION	Kansas State Dept. of Wildlife and Parks, Pratt. Wildlife Education Service.
PUB DATE	87
NOTE	75p.; For related documents, see SE 051 553-559.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052) -- Guides - Classroom Use - Materials (For Learner) (051)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Conservation (Environment); *Elementary School Science; *Environmental Education; *Grade 5; Instructional Materials; Interdisciplinary Approach; Intermediate Grades; Natural Resources; Science Education; Science Materials; Teaching Guides; *Wildlife
IDENTIFIERS	*Habitats

ABSTRACT

This publication is a part of a series of materials in the Wildlife Education Service for Kansas youth series. The goal of the program is to provide information about wildlife and to establish in children an awareness and appreciation of wildlife. A booklet for children and a teacher's guide are included. The booklet was written for fifth-grade children but can be easily adapted for other grades. The materials are designed for multidisciplinary use. The teacher's guide includes the following materials: (1) an introduction and foreword; (2) an opinionnaire about the materials; (3) a student award form; (4) ideas for classroom bulletin boards; (5) reproducible worksheets for students; (6) supplemental activities and approaches for language arts, science, art, industrial arts, mathematics, social studies, music, and physical education; and (7) appendices which list resources and references, and includes a glossary of terms used in teaching this topic. (CW)

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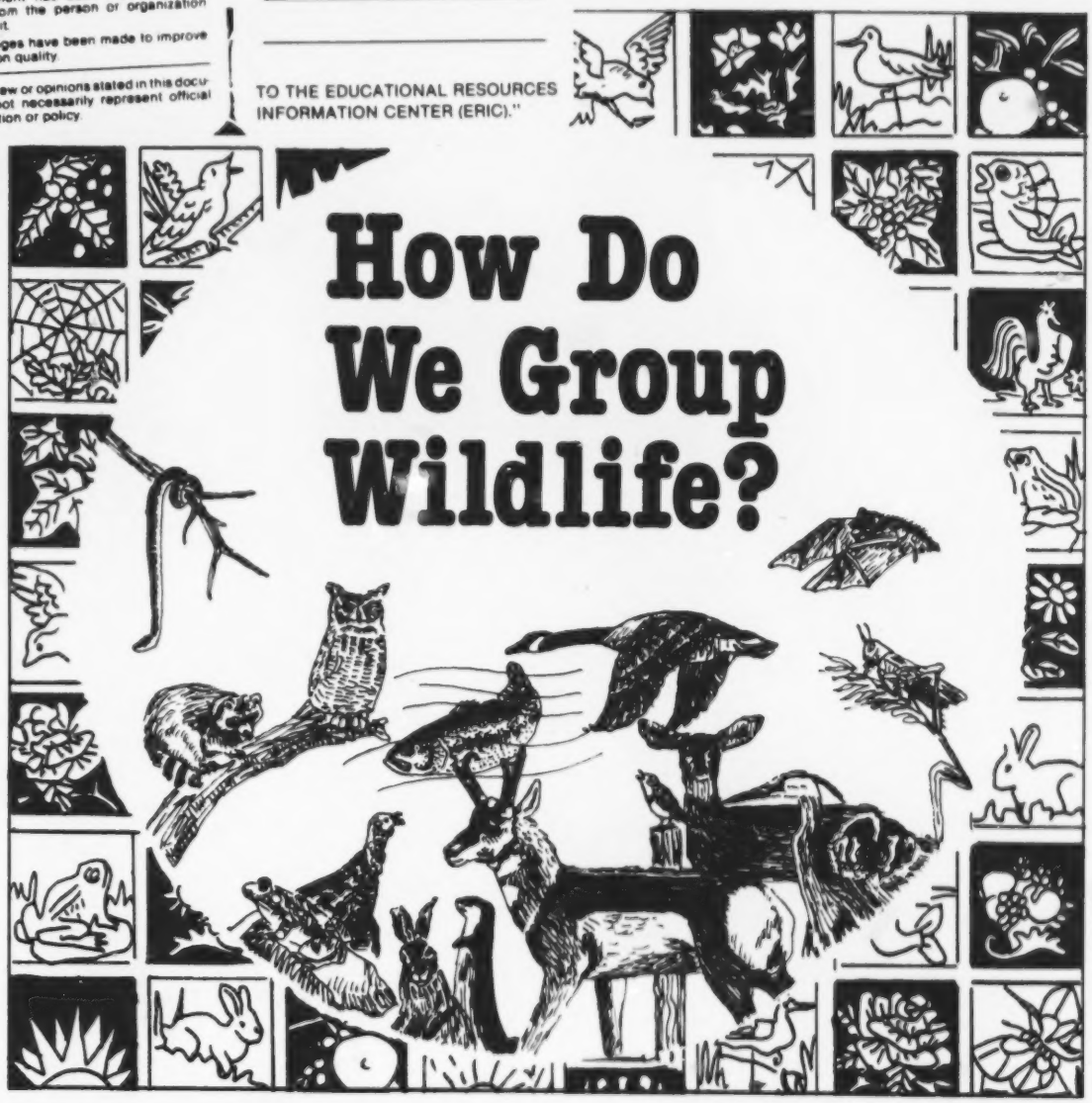

Teacher's Guide

SE051558

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KANSAS FISH AND GAME

NONCONSUMABLE

5

BEST COPY AVAILABLE

Teacher's Guide

How Do We Group Wildlife?

Comprehensive Program Written and Developed by

Joyce R. Harmon

Wildlife Education Coordinator

Design and Illustration by

Mike Miller

With special thanks to Debbie Schmidt and Alan Baccarella

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KANSAS FISH AND GAME

A series of wildlife education materials for Kansas youth from Kansas Fish and Game

THIS MATERIAL IS DEDICATED TO THE CHILDREN OF KANSAS; MAY THEY KNOW A LOVE OF WILDLIFE.

Funded by hunting and fishing license fees and the Nongame Wildlife Tax Check-Off Program

Wildlife Education Service
Kansas Fish and Game Commission
Box 54A Route 2
Pratt, Kansas 67124

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Introduction

HOW DO WE GROUP WILDLIFE? is part of a series of materials in the Wildlife Education Service for Kansas youth from Kansas Fish and Game Commission. (See inside cover of the student booklet for other titles.) The material is designed for use by teachers. The goal of the program is to provide information about wildlife and to establish in children an awareness and appreciation of wildlife. This booklet was written for **fifth grade** but can be easily adapted for other grades. The study of wildlife need not be limited to science class but should be multidisciplinary. Enrich your existing curricula with this material.

You do not have to be a biologist or wildlife expert to teach about wildlife. The Wildlife Education Service materials were written for anyone who has an interest in teaching children about wildlife and the environment. The worksheets and activities in the teacher's guide reinforce information in the student's booklet. Do any quantity or combination of activities and worksheets that are appropriate for your schedule. The lessons may be used as a unit of study or used throughout the year when time allows. The worksheets may be done in whatever sequence you choose.

ONE set of each grade's materials will be provided to each school to be shared among the teachers at that grade level. Maintain these materials for future year's use. This is a master copy. Replacements are not available. The materials may be reproduced if additional copies are needed or you choose to have copies for students to take home.

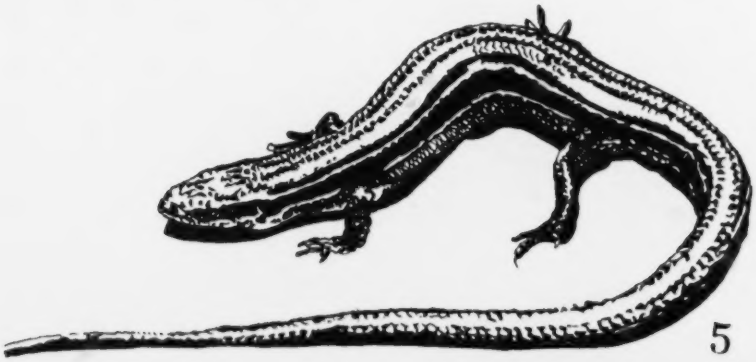
The Fish and Game Commission has a Wildlife Reference Center located at the Pratt headquarters. The center includes films, filmstrips, slide series, games, posters, books, and other wildlife-related material available to schools on a free-loan basis. Return mail cost is the only expense to the school for use of this material. Refer to your Wildlife Reference Center catalog for materials appropriate to your study. Especially recommended for use with this booklet are: FS-13, Investigating Vertebrates; FS-12, Investigating Insects; FS-14, Life Cycles; M-35, Fish and Their Characteristics; M-34, Birds: How We Identify Them; GK-6, Animal Kingdom; 5-1, Insects; 5-2, Butterflies and Moths; GK-13—GK-15, Yotta Know Birds, Waterfowl, and Mammals; M-74, Animals That Live In Water; M-76, Warm-Blooded Animals; M-77, Animals Protect Themselves; and SS-27, Representative Fishes Set. Be sure to check your Wildlife Reference Center catalog for other materials. A catalog has been sent to each school district office. Please contact your administration office for your district's copy. Orders will be filled on a first-come, first-served basis, so we suggest sending your requests in early.

To be effective, material must be used. This format was written to be easy to use, ready to use, and flexible. Little additional preparation or equipment is required. The most important ingredients for success in your lessons will be your enthusiasm and imagination. Technical references can be obtained from the Wildlife Reference Center or your local library.

The material is appropriate throughout Kansas, no matter what size community or region of the state you live in. It is not necessary to have a natural area near your school; use whatever is available. Many of the supplementary activities can be done on the schoolgrounds or in the classroom.

This program was funded by hunting and fishing license fees and, in part by the Nongame Wildlife Tax Check-off Program.

Remind your students that when they are outside they are company in the homes of wildlife; therefore, their best manners should be used.



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Foreword

In the time I have spent in Kansas, I have learned to appreciate the state that was once described as the great American desert. Kansas remains one of the better-kept secrets in the United States. The diversity of climate, terrain, and vegetation provides for a variety of wildlife. Use these attributes to the fullest in your classroom. Students are already interested in animals; tap that interest in all curricula areas by exploring what Kansas wildlife has to offer. Wildlife is a basic now more than ever. People, especially children, need to be more aware of wildlife and how their actions affect wildlife. The future of wildlife depends on actions we make today. Educate our young people to care about their future and the future of wildlife.

Please direct any questions or comments concerning the Wildlife Education Service materials to me at the Pratt headquarters. Good luck for a successful and exciting learning experience.

Joyce Harmon

Joyce R. Harmon
Wildlife Education Coordinator
Kansas Fish & Game Commission
RR 2 Box 54A
Pratt, Kansas 67124

A true conservationist is a man who knows that the world is not given by his fathers, but borrowed from his children. —*John Madson*

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Opinionnaire

Your input is important in continuing and improving this program. Any comments or ideas you want to share would be appreciated. Please make a copy of the opinionnaire below and complete it or send your suggestions on a separate sheet to:

Joyce R. Harmon, Wildlife Education Coordinator
Kansas Fish and Game Commission
RR 2 Box 54A
Pratt, Kansas 67124

Title of unit_____ Grade you teach_____
School district_____

The materials were:
_____ very useful _____ moderately useful _____ of no use

Students were:
_____very interested _____moderately interested _____not interested

The materials were appropriate for the grade you teach. ( ) yes ( ) no
(if no, list more appropriate grade)_____

Rank each of the following components on a scale of 1 to 5 based on their value for your use. (1 represents highest grade; 5 represents lowest grade)

_____ student booklet
_____ bulletin board idea
_____ student award
_____ worksheets
_____ supplementary activities & approaches
_____ glossary
_____ resources & references
_____ Wildlife Reference Center

List favorite worksheet (s) or activity (ies)

List curricula areas where you used the material

Approximate amount of time (hours, days) spent using the material

Changes you would recommend. Please be specific.

Other comments

7

Thank you for your time and effort.

After students have successfully completed their study of this aspect of wildlife, award their progress. Copies can be made of this award and presented to them at the end of your unit of study.

Wildlife Awareness Award

IS PRESENTED TO

_____
name

For outstanding progress shown in the study of Kansas Wildlife

on _____ at _____
date school

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_____
signed

motif by Daisy Baughman

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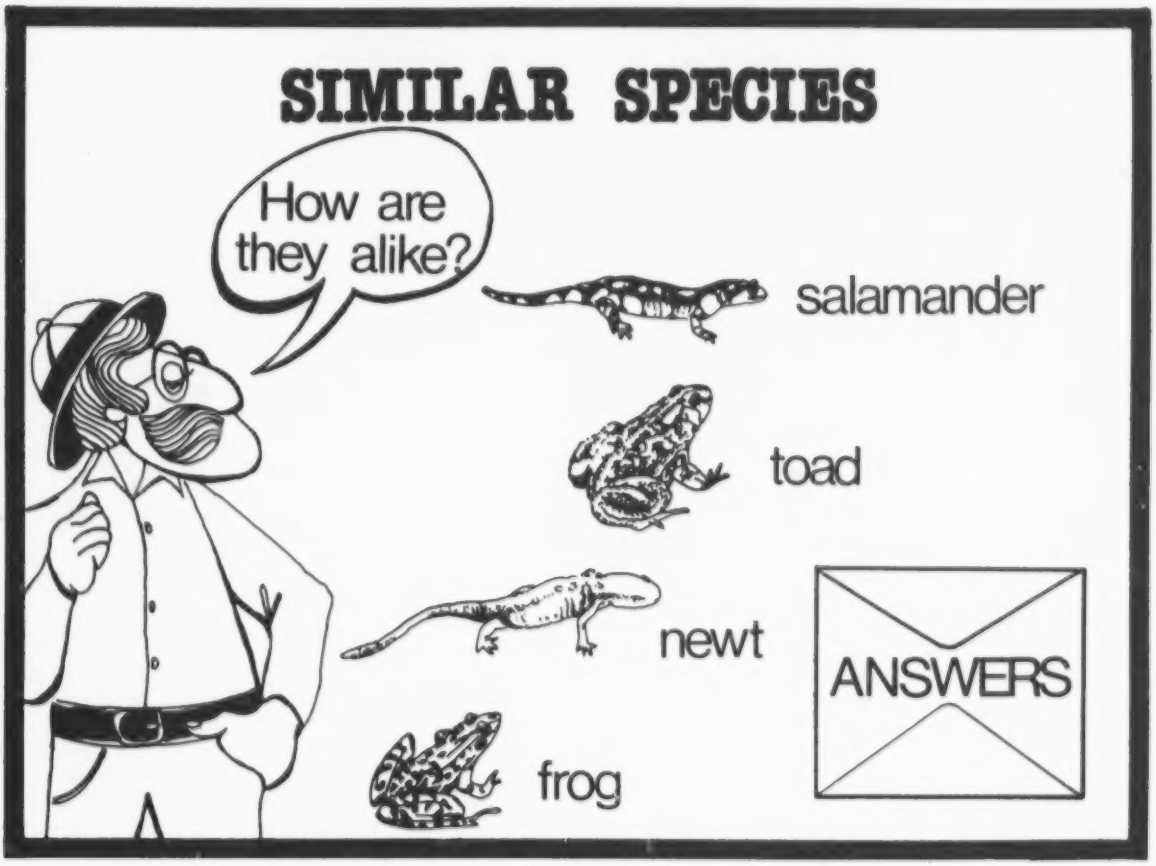
BULLETIN BOARD IDEA

Empty bulletin board or wall space can be put to practical use with the following idea. Students review classification skills by deciding how the following groups of animals are alike. Answers can be placed in an envelope and discussed at the end of the week. Start over with a new group of animals the next week. Below are a few suggestions; add your own ideas.



channel catfish
bluegill
walleye
paddlefish
(FISH)

rattlesnake
turtle
alligator
chameleon
(REPTILES)

mouse
coyote
whale
antelope
(EACH END IN SILENT E)

whale
otter
elk
bat
(MAMMALS)

brown recluse
owl
skunk
firefly
(NOCTURNAL)

dragonfly
beetle
butterfly
spider
(INVERTEBRATES)

passenger pigeon
Labrador duck
Steller's sea cow
Audubon's bighorn
(EXTINCT)

deer
grasshopper
beaver
antelope
(HERBIVORES)

western kingbird
largemouth bass
plains leopard frog
red-sided garter snake
(VERTEBRATES)

bobcat
eagle
hawk
scavenger beetle
(CARNIVORES)

black-footed ferret
whooping crane
gray bat
peregrine falcon
(ENDANGERED SPECIES)

scissortail flycatcher
Mississippi kite
winter wren
osprey
(BIRDS)

NAME _____

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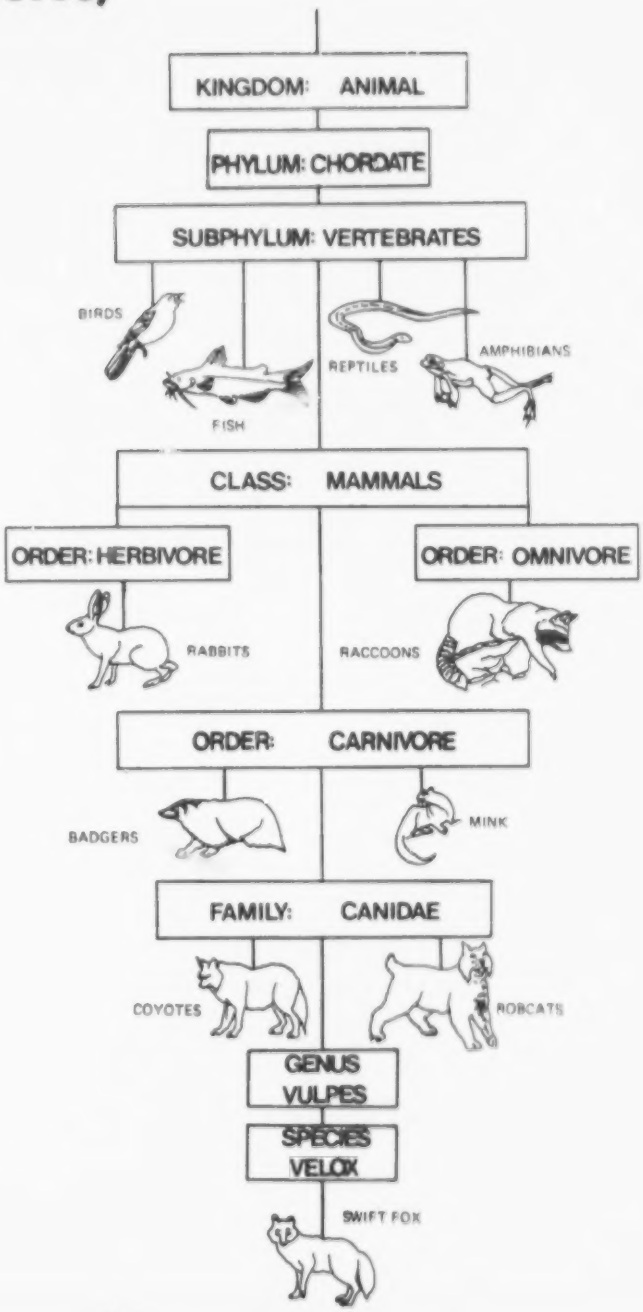
A HORSE IS A HORSE...

(...Of Course, Of Course)

Taxonomy is a system of classification that groups animals according to their similarities. For instance, all animals that have backbones are grouped as **vertebrates.** Vertebrates with feathers are grouped as birds while those with hair or fur are recognized as mammals. These broad groups are further separated. Mammals that grow antlers are deer, those that gnaw with large curved incisors (like beavers and mice) are rodents. The more physical characteristics animals have in common, the more closely they are related.

The standard ranking system classifies creatures from broad similarities to specific similarities in these categories: kingdom, phylum, class, order, family, genus, species.

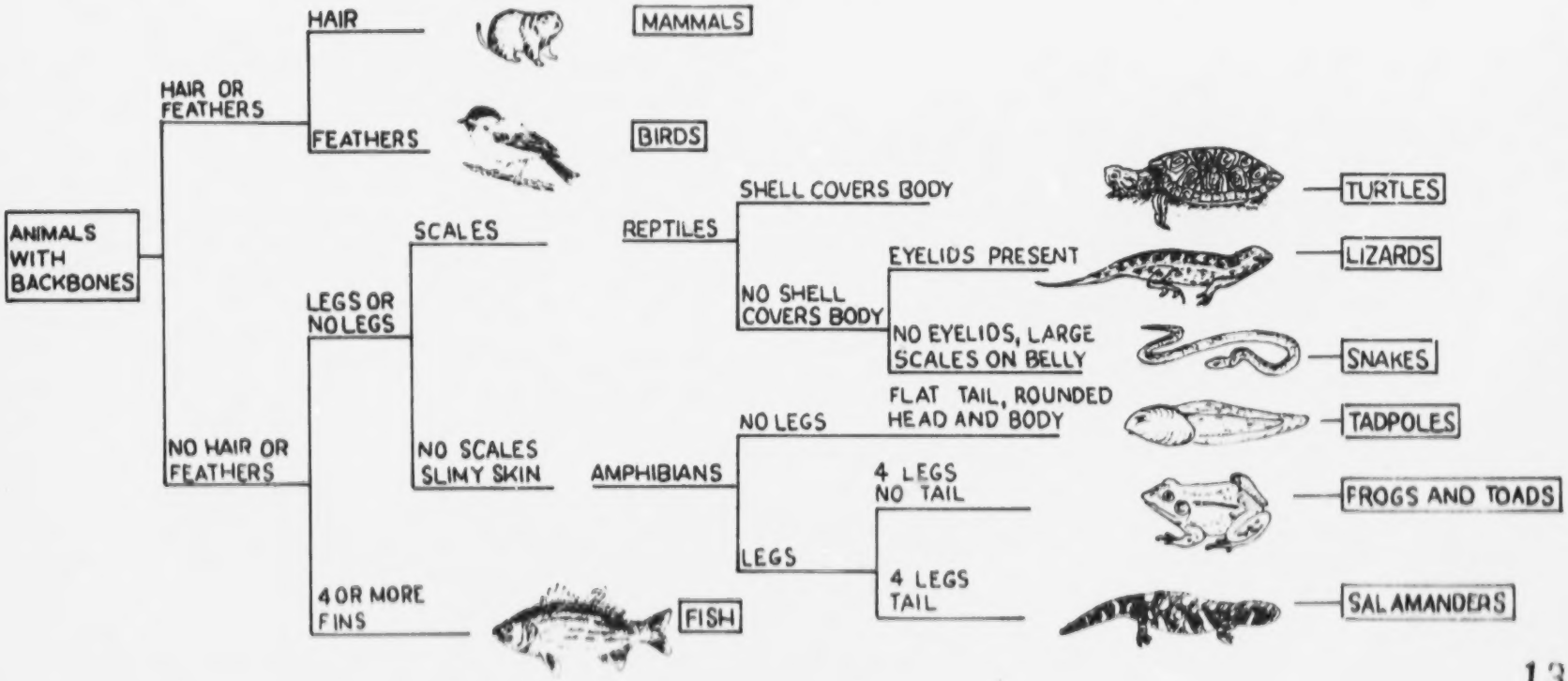
Try your hand at classifying an animal by building a mobile. Attach pictures and names to cardboard backing and hang them beneath one another in the appropriate order. This mobile classifies *Vulpes velox*, the Swift Fox.



NAME _____

KEY TO VERTEBRATES

Directions: Keys are used to identify animals based on physical characteristics. They can be general or very specific, showing differences between species. This key can be used by moving across the page from left to right. The reptile and amphibian groups have been extended to show further detail. See if you can make up your own key.



NAME

Adapted from Illustrated Guide to Amphibians and Reptiles in Kansas.

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clever character~istics

Directions: Listed below are characteristics which describe vertebrates. In the blanks provided, write the number of each characteristic that applies to the vertebrate groups. Some numbers will be used more than once. Remember there may be exceptions to the characteristics (not all fish have scales). Look back at your booklet to check your work. Name at least two Kansas animals for each class – mammal, bird, reptile, amphibian, and fish.

1. are warm-blooded
2. are cold-blooded
3. bodies are covered with hair
4. bodies usually have scales
5. have feathers
6. have moist skin without scales
7. adults generally have 4 legs
8. have two legs and wings
9. have short legs or no legs at all
10. have fins
11. breathe through lungs
12. breathe through gills
13. young breathe with gills but usually develop lungs as adults
14. live in water throughout life
15. live on land part of life and in water part of life
16. feed their young milk
17. have beaks or bills
18. young are hatched from eggs
19. most young hatched from eggs but some born live
20. most young born live but a few hatched from eggs

Characteristics of Mammals

__ __ __ 1._____

__ __ __ 2._____

Characteristics of Reptiles

__ __ __ 1._____

__ __ __ 2._____

Characteristics of Birds

1 __ __ 1._____

__ __ __ 2._____

Characteristics of Amphibians

7 __ __ 1._____

__ __ __ 2._____

Characteristics of Fish

__ __ __ 1. channel catfish

__ __ __ 2._____

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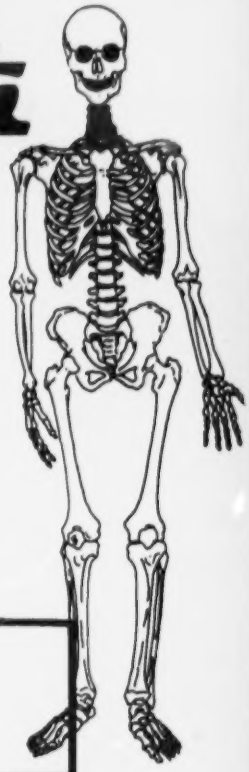
VERTEBRATES

Similarities & Differences



Directions: Fill in the spaces with the correct information. Go back to your booklet to check your work.

VERTEBRATE CLASS

CHARACTERISTICS	Mammals	Birds	Reptiles	Amphibians	Fish
Warm- or Cold-blooded					
Body Covering					
Type of Appendages (legs, wings, etc.)					
Mechanism used to breathe					
Live Born or Hatched					
Where they live					

NAME _____

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Categorically Speaking

Directions: See if you can name an animal for each category by using only a letter as a clue. Fill in each blank under the letter heading with any letter you choose. Follow the example to complete the chart. Use a timer and race against a friend for fun. Use encyclopedias for help. Add other categories to make it harder. Use different letters each time you play.

CATEGORIES

Letter	Carnivore	Warm-blooded	Kansas animal	Herbivore	Animal with scales
T	tiger	toucan	teal	termite	trout

NAME _____

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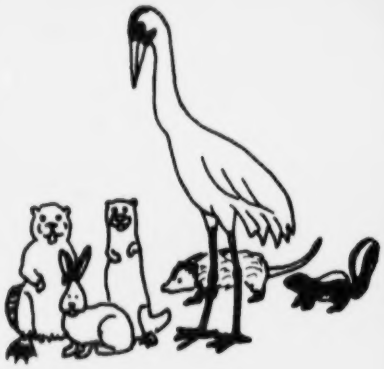
SOMEBODY DOESN'T FIT



Directions: In each of the groups below, one animal does not belong. Put a line through the animal that doesn't belong and replace it with an animal that does. Choose from the categories below to name the entire category. The first one has been done for you.

Categories

mammals	amphibians	herbivores	have wings
reptiles	insects	carnivores	extinct
birds	fish	water-dwelling mammals	endangered

prairie rattlesnake	crow	cow
red-eared turtle	bat	cardinal
alligator	woodpecker	horse
chameleon	coot	bobcat
~~tiger salamander~~	penguin	grasshopper

Five-lined skink
Reptiles

grasshopper	bat	channel catfish
crane	whale	shark
flying squirrel	camel	white bass
bat	bluegill	trout
butterfly	coyote	starfish

mosquito	whale	whooping crane
passenger pigeon	manatee	pallid sturgeon
sea mink	dolphin	central newt
great auk	elk	black-footed ferret
Carolina parakeet	porpoise	whitetail deer

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NAME

NAME _____

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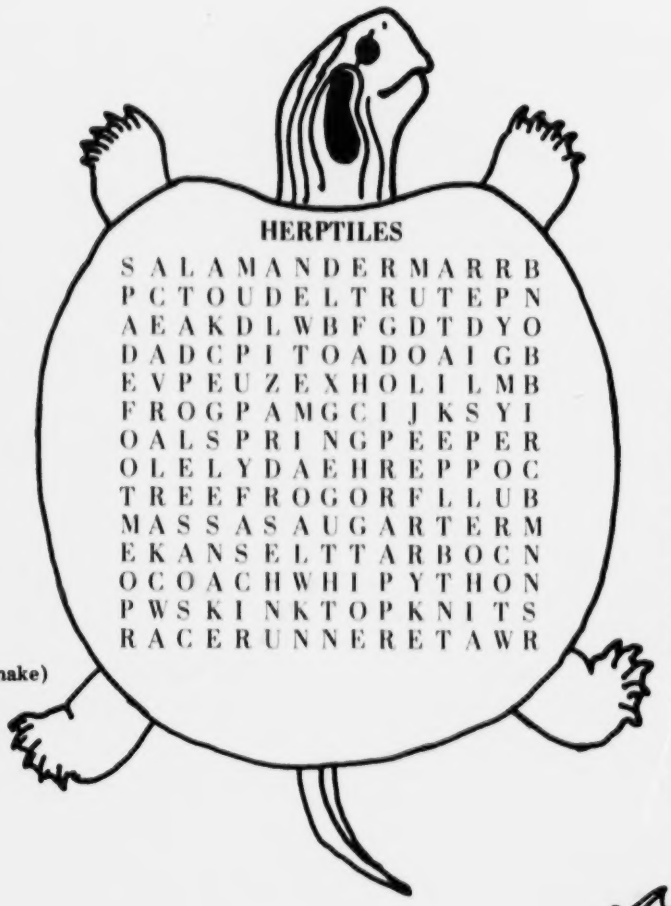
HIDE N' SEEK

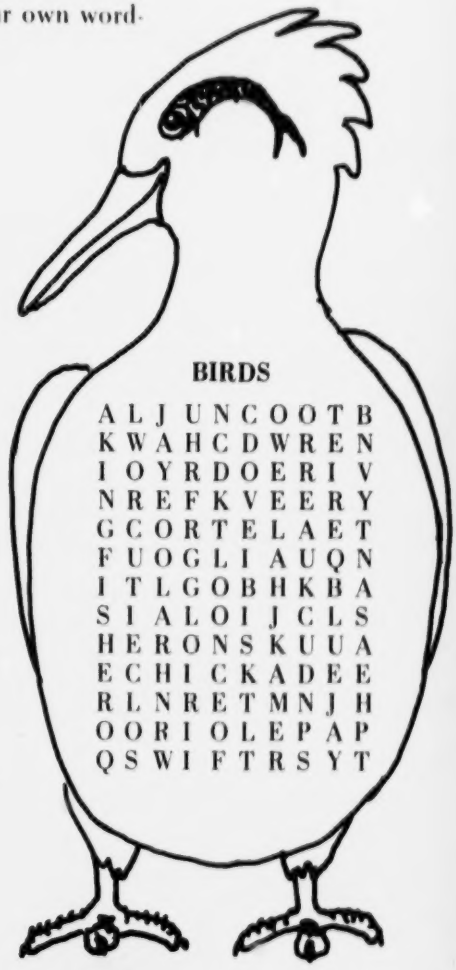
Directions: Circle the names of wildlife that belong in each animal class represented below. Answers run forwards, backwards, diagonally, up, and down. Try making your own word-search puzzle.



larva
skink
salamander
newt
mudpuppy
toad
spadefoot
tree frog
spring peeper
bullfrog
tadpole
turtle
slider
lizard
massasauga
garter (snake)
box (turtle)
copperhead
rattlesnake
gila (monster)
gecko
mud (turtle)
racerunner
coachwhip
stinkpot
python
pygmy (rattlesnake)
cobra
water (snake)
ribbon (snake)
map (turtle)
egg
frog

HERPTILES

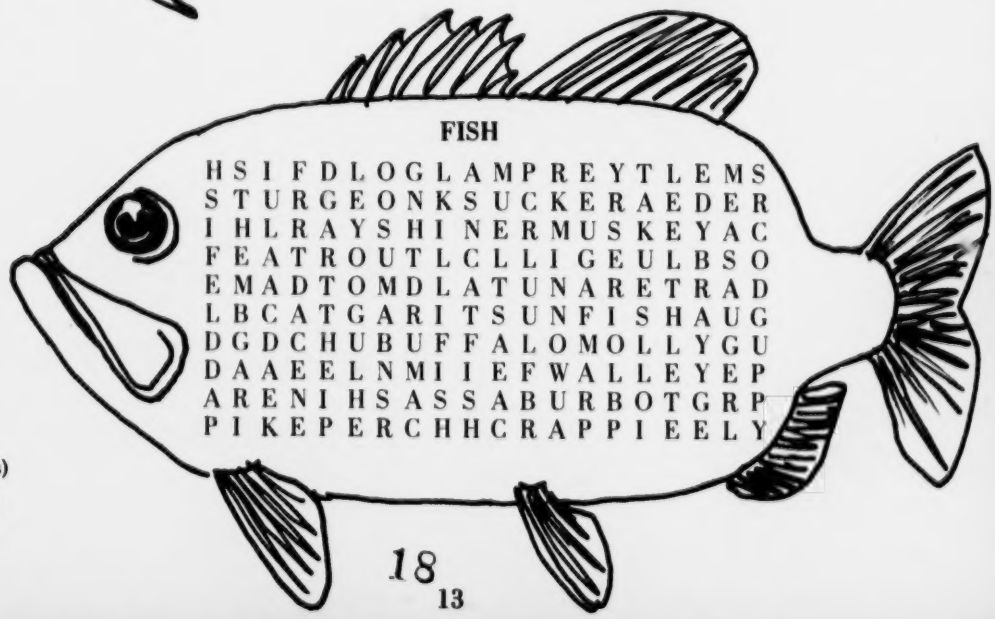
S A L A M A N D E R M A R R B
P C T O U D E L T R U T E P N
A E A K D L W B F G D T D Y O
D A D C P I T O A D O A I G B
E V P E U Z E X H O L I L M B
F R O G P A M G C I J K S Y I
O A L S P R I N G P E E P E R
O L E L Y D A E H R E P P O C
T R E E F R O G O R F L L U B
M A S S A S A U G A R T E R M
E K A N S E L T T A R B O C N
O C O A C H W H I P Y T H O N
P W S K I N K T O P K N I T S
R A C E R U N N E R E T A W R



ibis
swift
stork
loon
wren
veery
vireo
oriole
tern
teal
pheasant
bluejay
coot
duck
quail
chickadee
dove
eagle
finch
gull
heron
kingfisher
jay
owl
hawk
crow
lark
junco

BIRDS

A L J U N C O O T B
K W A H C D W R E N
I O Y R D O E R I V
N R E F K V E E R Y
G C O R T E L A E T
F U O G L I A U Q N
I T L G O B H K B A
S I A L O I J C L S
H E R O N S K U U A
E C H I C K A D E E
R L N R E T M N J H
O O R I O L E P A P
Q S W I F T R S Y T



sucker
darter
crappie
burbot
perch
walleye
sturgeon
paddlefish
gar (3 times)
eel (3 times)
shad
trout
pike
carp
shiner (2 times)
chub
dace
buffalo

minnow
killifish
catfish
madtom
bass
sunfish
bluegill
drum
sauger
redear
molly
goldfish
guppy
cod
tuna (2 times)
muskey
ray (2 times)
smelt
lamprey

FISH

H S I F D L O G L A M P R E Y T L E M S
S T U R G E O N K S U C K E R A E D E R
I H L R A Y S H I N E R M U S K E Y A C
F E A T R O U T L C L L I G E U L B S O
E M A D T O M D L A T U N A R E T R A D
L B C A T G A R I T S U N F I S H A U G
D G D C H U B U F F A L O M O L L Y G U
D A A E E L N M I I E F W A L L E Y E P
A R E N I H S A S S A B U R B O T G R P
P I K E P E R C H H C R A P P I E E L Y

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CLASSY ADAPTATIONS

We use characteristics, such as special adaptations, to classify animals. Animals are adapted to the environment in which they live. For example, ducks have webbed feet to help them swim and walk along the shore, and desert animals have tough outer skin for protection from the sun.

For each adaptive category below, choose one animal, name its class (mammal, bird, etc.), and describe how this animal is adapted. The first one is done for you.

Animal is adapted to its habitat or surroundings.
Animal: Walleye
Class: Fish

Walleye have gills to breathe in water, fins for locomotion. Scales and body shape help them move through the water. Walleye are generally found in the deeper water of large lakes.

Animal defends itself or escapes from enemies.
Animal.
Class:

Animal is camouflaged.
Animal:
Class:

Animal cares for young in an unusual way.
Animal:
Class:

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NAME _____

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Animal makes use of its senses (smell, sight, hearing, touch, and taste) in special ways.
Animal:
Class:

Animal uses its body to store or get food.
Animal.
Class:

what would you do?

You have been hired to do wildlife research in the Species Investigation section of the Kansas Fish & Game Commission. An unusual animal specimen has been brought into your office. Your goal is to place the animal into a class based on your observations. Unfortunately, your observations are quite unusual and you are faced with a problem. Using the observations listed below, what class (mammal, reptile, etc.) would you place this animal in? Why?

OBSERVATIONS

1. Hair on parts of body, scales on remainder
2. Predator
3. Front legs short, hind legs long, wing-like structure on both sides
4. Size: approximately 10 inches in length, weight 6 lbs.
5. Breathes through lungs
6. Teeth present

Animal Class
Reason for selection

What techniques would you recommend be used to manage this species in Kansas?

NAME _____

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TEST YOUR SKILLS

WHERE DO THEY BELONG?

Classify the following animals by class. M = mammals, B = birds, R = reptiles, A = amphibians F = fish, I = insects, and O = other.

1. _____ antelope
2. _____ silver fish
3. _____ cardinal
4. _____ monarch butterfly
5. _____ great-horned owl
6. _____ egret
7. _____ whitetail deer
8. _____ rattlesnake
9. _____ leopard frog
10. _____ eel
11. _____ bat
12. _____ turtle
13. _____ crocodile
14. _____ catfish
15. _____ osprey
16. _____ mallard
17. _____ trout
18. _____ great blue heron
19. _____ alligator
20. _____ hornet
21. _____ salamander
22. _____ toad

23. _____ turkey
24. _____ elk
25. _____ bluegill
26. _____ pheasant
27. _____ bass
28. _____ seal
29. _____ otter
30. _____ monkey
31. _____ anteater
32. _____ kangaroo
33. _____ armadillo
34. _____ mosquito
35. _____ cow
36. _____ dog
37. _____ pigeon
38. _____ ant
39. _____ whale
40. _____ frog
41. _____ seahorse
42. _____ shark
43. _____ starfish
44. _____ clam

KEY
1.–M. 2.–I. 3.–B. 4.–I. 5.–B. 6.–B. 7.–M. 8.–R. 9.–A. 10.–F. 11.–M.
12.–R. 13.–R. 14.–F. 15.–B. 16.–B. 17.–F. 18.–B. 19.–R. 20.–I. 21.–A.
22.–A. 23.–B. 24.–M. 25.–F. 26.–B. 27.–F. 28.–M. 29.–M. 30.–M. 31.–M. 32.–M.
33.–M. 34.–I. 35.–M. 36.–M. 37.–B. 38.–I. 39.–M. 40.–A. 41.–F. 42.–F. 43.–O. 44.–O.

NAME _____

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INSECT INVESTIGATION

Insects are the most plentiful group of animals. Explore the variety you have in your yard or schoolground. Use this chart to help record your data.

Kind of Insect	Location	Color and Shape	Size (approx)	What it eats (if possible)	Commu-nication Technique	Means of Travel	Found in a Group or Alone	Drawing
grasshopper	field	green & brown long oval body	1½-2" long	plants	with its antennae	fly and crawl	alone	

NAME _____

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Adjective Bingo

Adjectives are words that describe nouns. There are many adjectives that describe characteristics of the environment. Characteristics are also used to classify animals. While on a hike, look for natural things that these characteristic adjectives describe. Underline each adjective that describes the things you see. Underline only one adjective for each item you observe and write the object's name in the appropriate box. You have completed the bingo sheet when 5 squares in a row are underlined (across, down, or diagonally). Try for a blackout.

Rough	Shiny	Soft	Smooth	Green
Hard	Dead	Slippery	Wet	Warm
Living	Small	Dry	Sticky	Flat
Fuzzy	Bendable	Bumpy	Ancient	Large
Cold	Brown	Furry	Bruised	Decaying

Select at least three other adjectives not listed above that describe natural things you've observed. Then, make up your own creative adjective.

NAME _____

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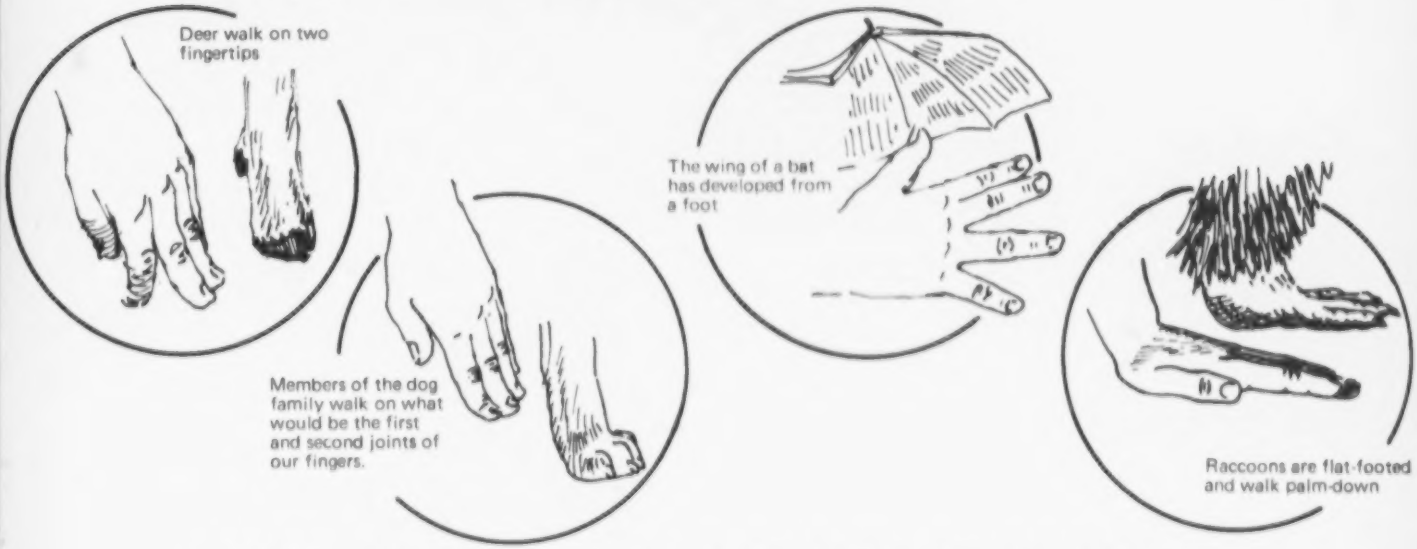
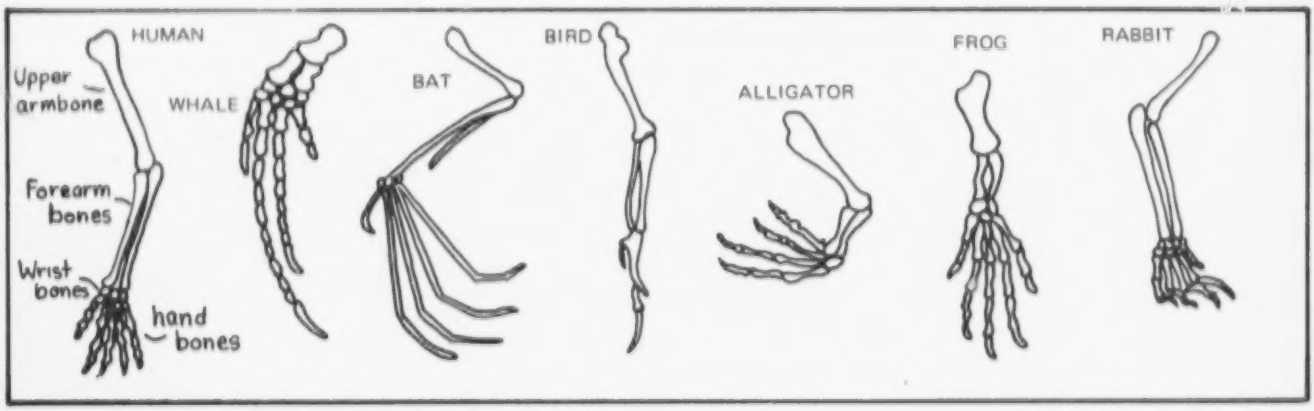
THE KNEE BONE'S CONNECTED TO THE...

By comparing human bones to those of other animals we can see how they are alike in structure and purpose. Examine the illustrations below.



Label the upper arm bone, forearm bones, wrist bones, and hand bones on each of the forelimbs below.



ALL THUMBS

Humans are not the only creatures to have opposable thumbs. **Opposable** means: able to be placed opposite of something. In this case, our thumbs can move opposite our fingers. See how important that is to you by taping down the thumb of your dominant hand. Try to eat your lunch while you have your thumb out of commission.

Make a list of other mammals that have opposable thumbs.

NAME _____

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TWO HALVES MAKE A WHOLE

Symmetry is a characteristic of some living and nonliving things where half of the body is a mirror image of the other half. A line of symmetry cuts something exactly in half. Look at the half drawings of animals below and complete the drawings as carefully as possible.

NAME _____

25

HOW DO WE GROUP WILDLIFE?

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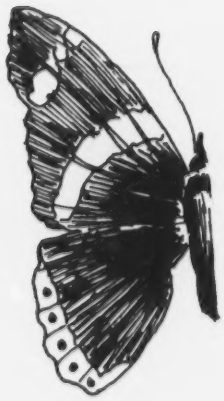
1/2 + 1/2 = 1



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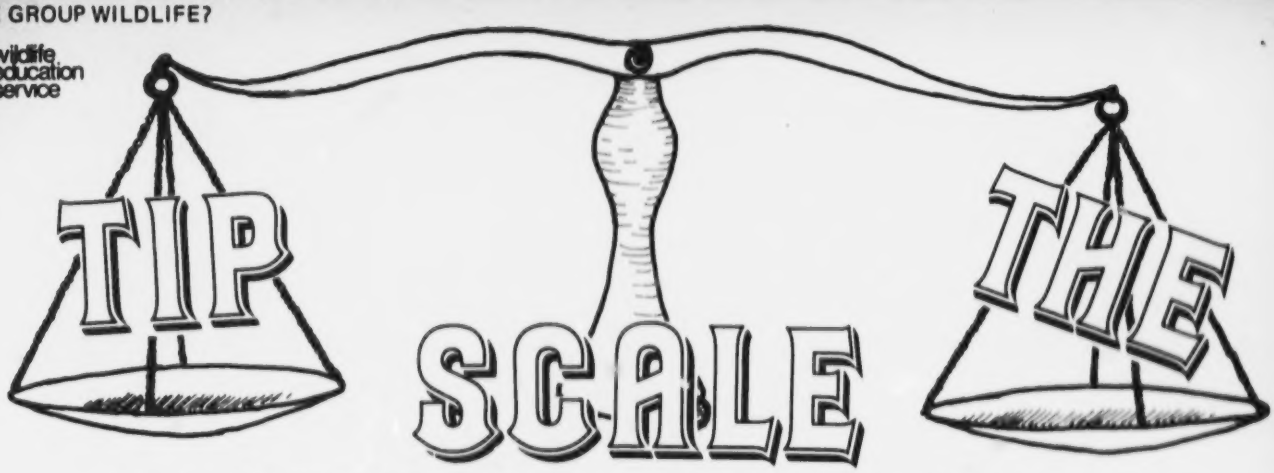

Animals can be classified by size. The average length and weight of several Kansas mammals is recorded in the chart below. Graph the data and solve the problems.

	Total length (mm)	Weight (kg)
Jack rabbit	553	3.2
Coyote	1220	14.2
Swift fox	798	2.4
Raccoon	808	8.6
Armadillo	728	3.9
Black-footed ferret	514	560.0(g)
Big brown bat	120	24.8(g)
Mink	589	877.0(g)
Flying squirrel	229	77.0(g)
Badger	722	5.9
Striped skunk*	678	3.0
Bobcat	912	6.8
Mule deer	1480	135.0
Whitetail deer	1745	128.0
Pronghorn	1358	59.0
Buffalo*	2890	660.0
Porcupine	751	13.5
Beaver	1076	20.5
Gray squirrel	462	548.0(g)
White-footed mouse	176	31.8(g)

*male larger than female

To answer some of the following problems, you will need to convert kilograms to grams or grams to kilograms. Complete the conversion factor below to help with your work.

____kg. = ____g.

NAME _____

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How many of the weight measurements are done in grams instead of kilograms? Why do you think grams were used?

How many species fit into the 3 to 30 kg. weight category?

The average adult weight of black-footed ferrets is 560g. Convert grams to kgs. and compare this number with the weight of a swift fox. Which is larger? Show your work.

Arrange the following animals in weight from smallest to largest: striped skunk, big brown bat, buffalo, coyote, mule deer, beaver, white-footed mouse, pronghorn, and armadillo.

Name the smallest animal in length. _____

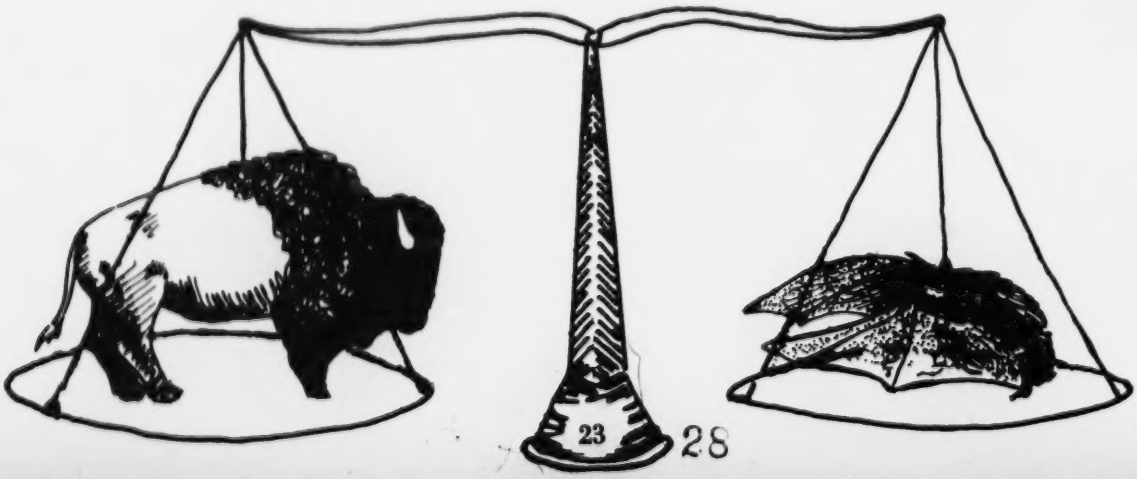
Name the smallest animal in weight. _____

Name the longest animal in length. _____

Name the largest animal in weight. _____

Record your weight _____ kg; and your height _____ mm.

Compare your measurements to those species listed. Which animals are you closest to in these categories?



NAME _____

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AVIAN ANATOMY

You've read about the characteristics of animals and the ways they are grouped. Within a group of animals, such as birds, grouping continues. Birds are quite diverse. The group is divided into smaller groups by behavior and appearance. You can often tell what a bird eats and where it lives by its beak and feet. Match bird beaks with the appropriate feet. In the blank space next to the head, write what you think each bird eats (seeds, worms, insects, mice, etc.). In the blank next to the feet, write what the foot is best adapted for (i.e. swimming, climbing, hopping, gripping, catching, etc.).

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Raptors are birds of prey; they hunt for their food.
Wading or **shore** birds spend their time around water and are adapted for that habitat.
Song birds can include birds of a variety of different appetites including seed, insect, or worm-eaters.
Name at least two species for each of these three kinds of birds. Use a bird field guide for help.

Bonus: What does **avian** mean? _____
What does **anatomy** mean? _____

NAME _____

HOW DO WE GROUP WILDLIFE?

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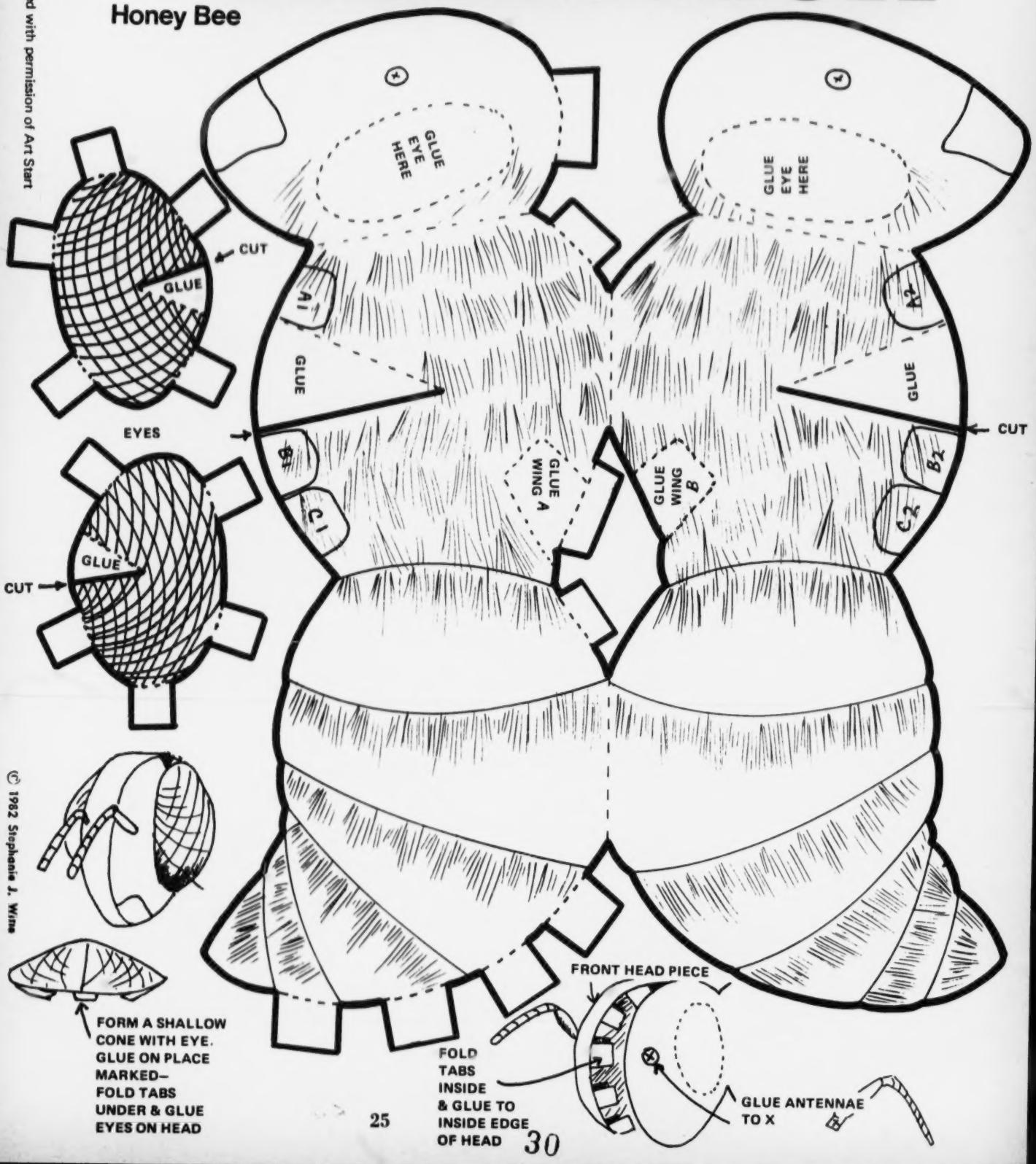
KANSAS FISH AND GAME

WILDLIFE IN ANOTHER DIMENSION

Honey Bee



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Bee cont.

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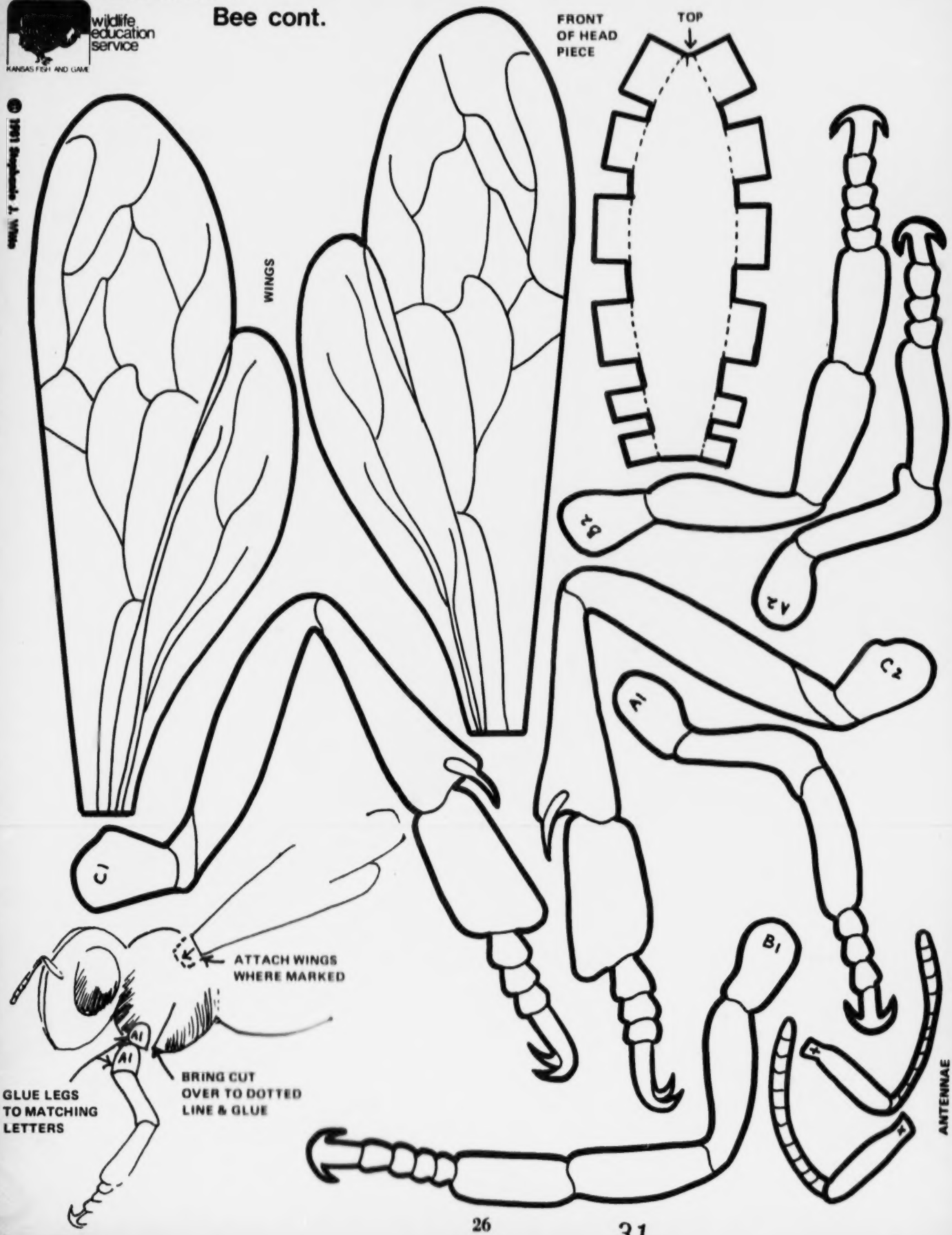

HOW DO WE GROUP WILDLIFE?

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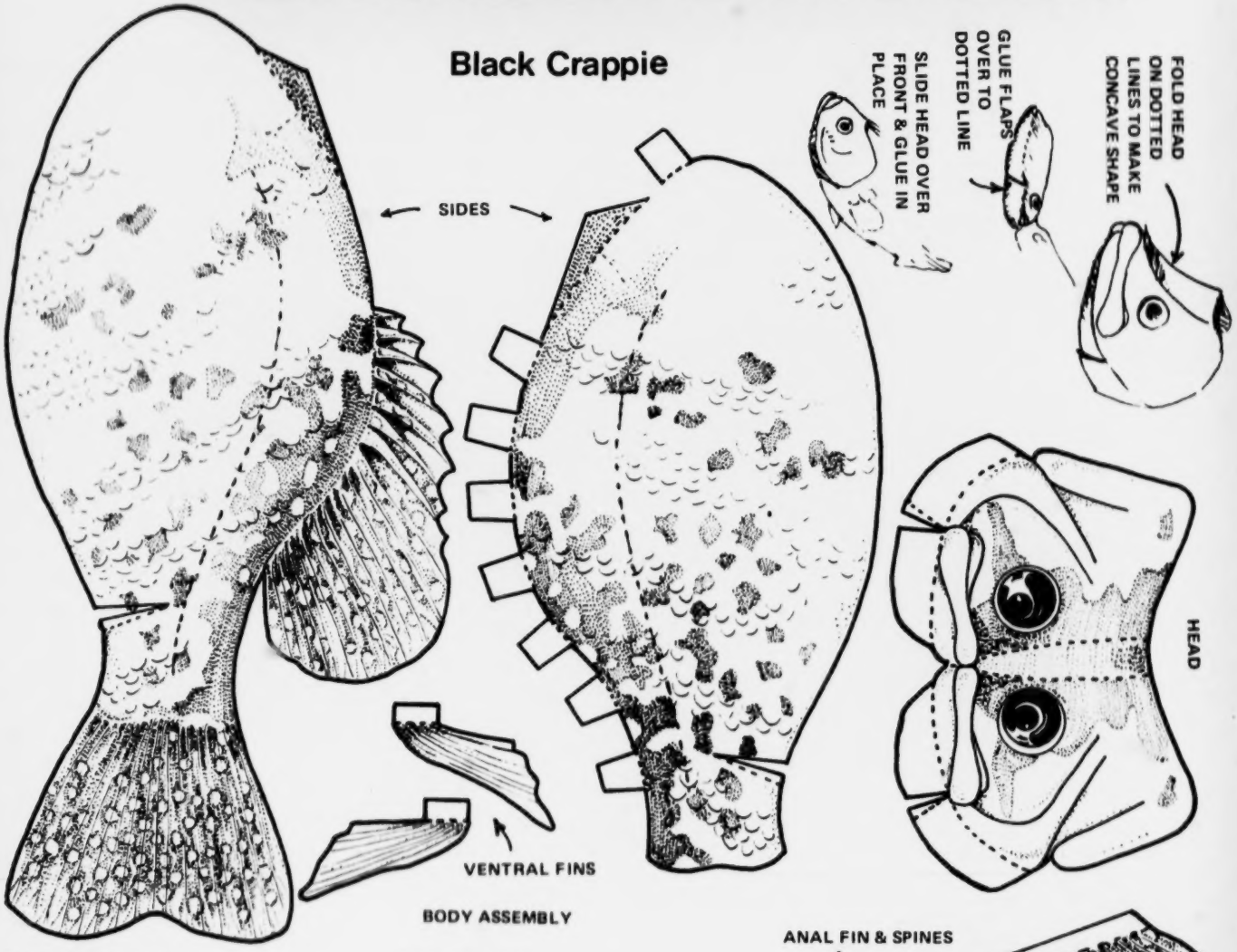
WILDLIFE IN ANOTHER DIMENSION

Black Crappie

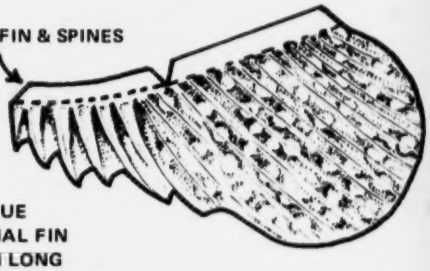


1. GLUE BOTH SIDES TOGETHER

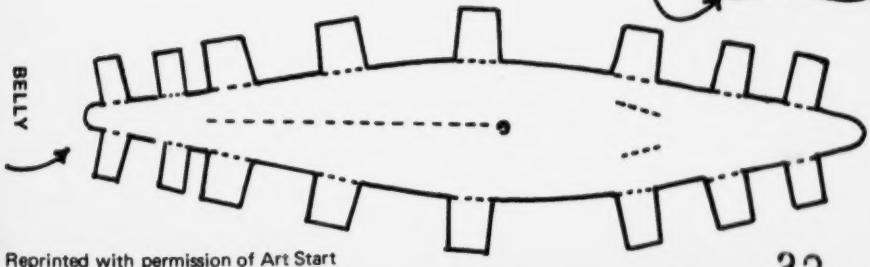
2. GLUE UNDERBELLY PIECE TO SIDES

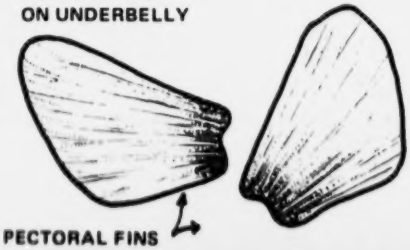
3. GLUE PECTORAL FINS BELOW DOTTED CURVE

4. GLUE VENTRAL FINS TO SHORT DOTTED LINES ON UNDERBELLY



GLUE ANAL FIN ON LONG DOTTED LINE ON UNDERBELLY





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HOW DO WE GROUP WILDLIFE?

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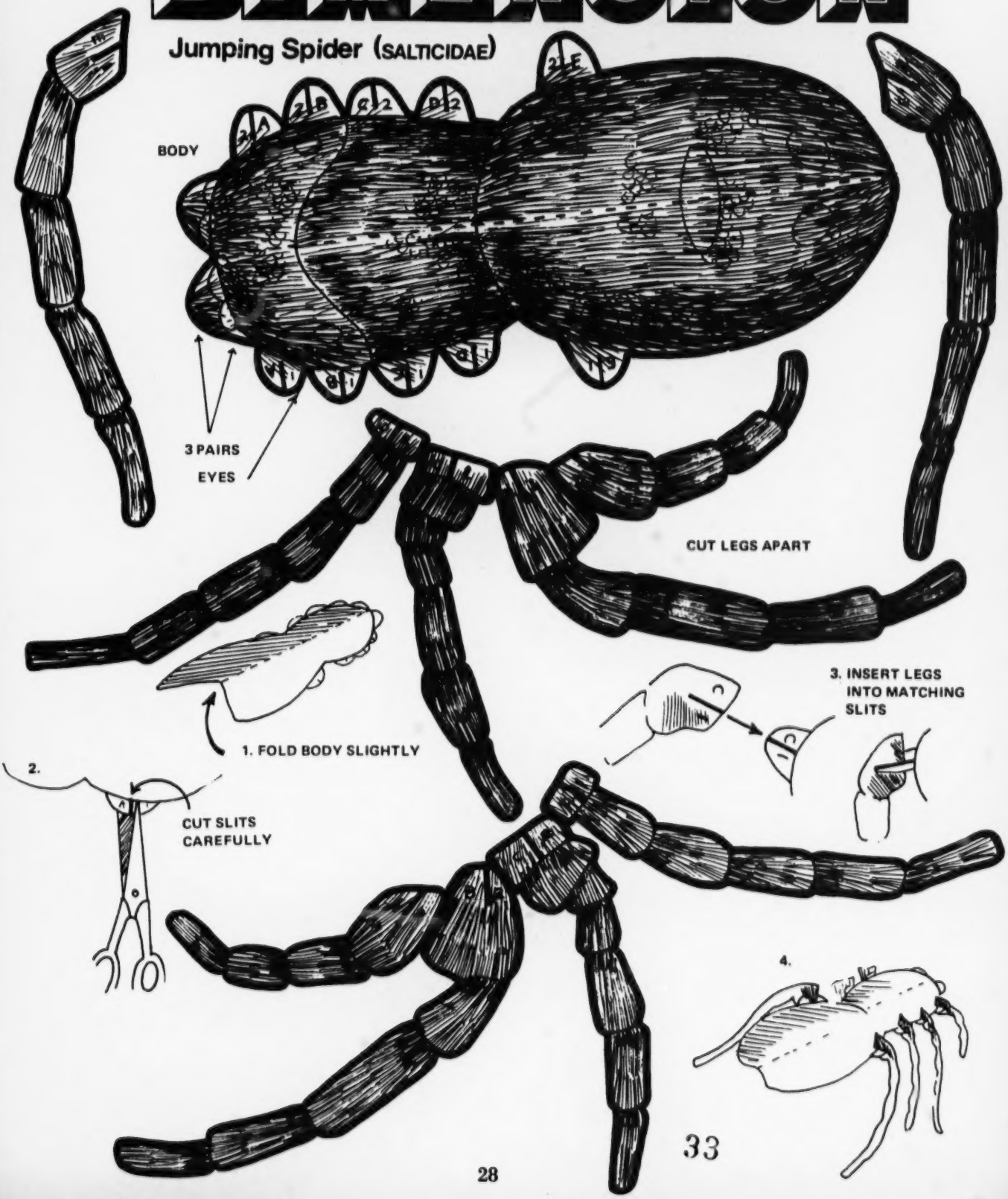
WILDLIFE IN ANOTHER DIMENSION

Jumping Spider (SALTICIDAE)



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HOW DO WE GROUP WILDLIFE?

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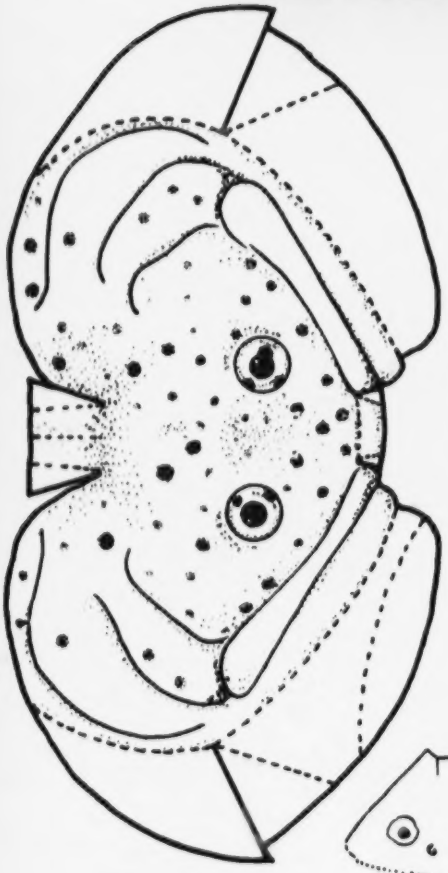
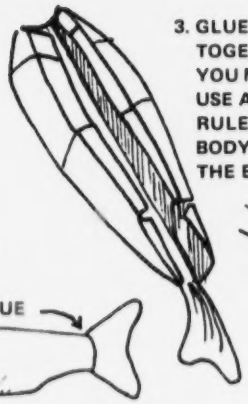
WILDLIFE IN ANOTHER DIMENSION

Rainbow Trout

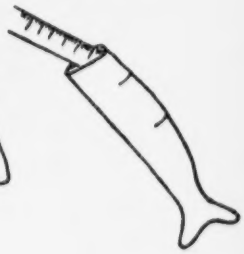


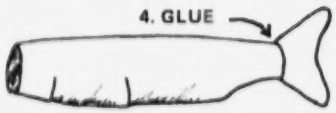
1. FOLD ALONG MIDDLE DOTTED LINE TO FORM BACK OF FISH

2. GLUE SLITS OVER TO DOTTED LINE

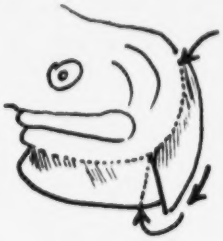


3. GLUE BOTTOM TOGETHER CAREFULLY YOU MAY WANT TO USE A PENCIL OR RULER INSIDE THE BODY TO HELP PRESS THE EDGES TOGETHER





4. GLUE

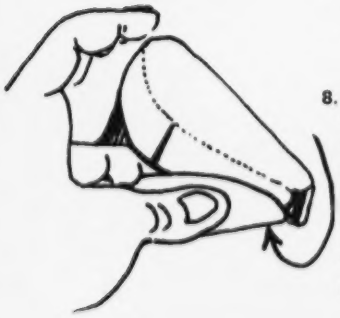


5. FOLD THE CURVED DOTTED LINE CAREFULLY THEN GLUE THE SLIT EDGE OVER TO THE DOTTED LINE (ON BOTH SIDES)

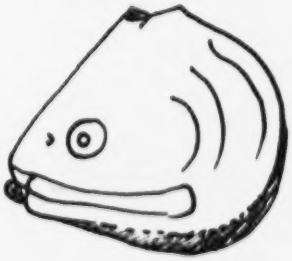
6. GLUE SLITS ON TOP OF THE HEAD

FOLD ON THE MIDDLE DOTTED LINE

7. CUT SMALL SLITS ON FRONT OF THE HEAD & GLUE THE EDGES OVER TO THE DOTTED LINES TO SHAPE THE LIP

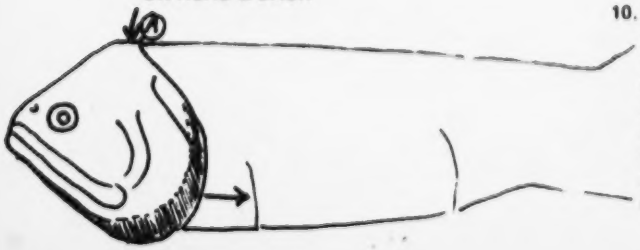


8. GLUE BOTTOM EDGES TOGETHER TO THE EDGE OF THE DOTTED LINE – IT HELPS TO STICK YOUR FINGER INSIDE & USE YOUR THUMB TO HOLD UNTIL THE GLUE STICKS



9. FINISHED HEAD PIECE

MATCH ON DOTTED LINE ON HEAD & BACK



10. SLIDE THE BODY INTO THE HEAD PIECE UP TO THE FIRST BODY SLIT GLUE HEAD TO BODY AT POINT A & AT THE GILL SECTION. HEAD SHOULD TILT DOWN SLIGHTLY AS PICTURED

11. ADD FINS WHERE MARKED BY DOTTED LINES & NUMBERS

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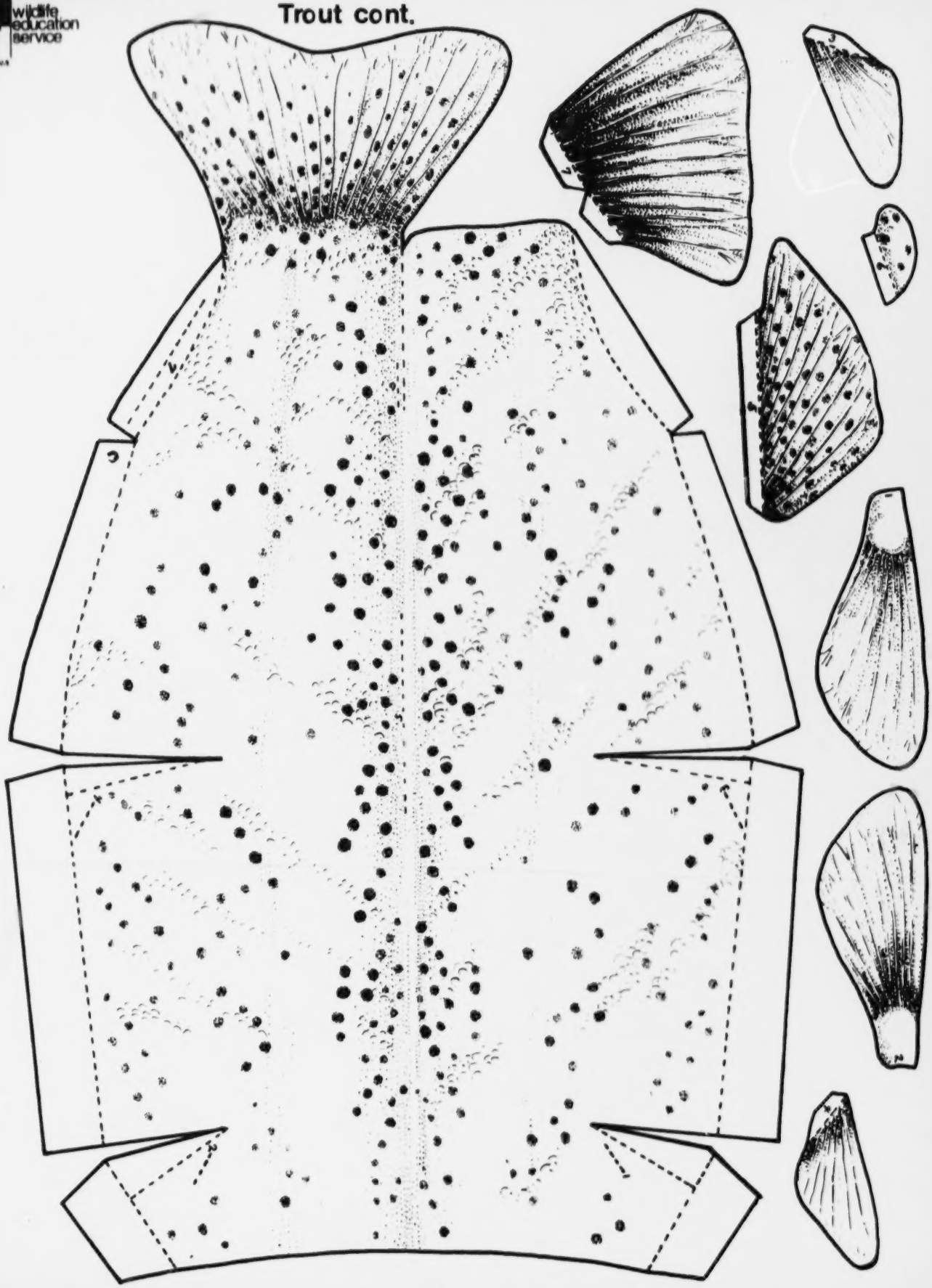
Trout cont.



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KANSAS FISH AND GAME

TAXONOMIC TERMS

Taxonomy is the study of animal and plant classification. See which questions you can answer right away. Complete the remaining questions with further study.

1. Putting animals into groups to make study easier is called
   a) phylum.
   b) cold-blooded.
   c) classification.
   d) herbivore.

2. Animals with backbones are
   a) invertebrates.
   b) vertebrates.
   c) characteristics.
   d) mammals.

3. The five main groups of vertebrates are
   a) mammals, birds, reptiles, amphibians, and fishes.
   b) mammals, insects, birds, amphibians, and fishes.
   c) mollusks, mammals, reptiles, fishes, and insects.
   d) reptiles, spiders fishes, mammals, and birds.

4. Animals that maintain a constant body temperature are
   a) amphibians.
   b) cold-blooded.
   c) reptiles.
   d) warm-blooded.

5. Herbivores are
   a) hungry.
   b) plant-eaters.
   c) meat-eaters.
   d) eat both plants and meat.

6. Animals that change body temperature to match their surroundings are
   a) cold-blooded.
   b) mammals.
   c) vertebrates.
   d) warm-blooded.

7. Reptiles breathe with
   a) air pockets.
   b) gills.
   c) lungs.
   d) both gills and lungs.

8. Omnivores eat
   a) plants.
   b) animals.
   c) both plants and animals.
   d) fish.

9. Animals that are active during the day are
   a) hibernators.
   b) nocturnal.
   c) tired.
   d) diurnal.

10. Amphibians are covered with
   a) hair.
   b) scales.
   c) moist skin.
   d) feathers.

BONUS:

Why are animals classified? _____

_____

List at least three ways that animals are classified. _____

_____

_____

NAME _____

KEY: 1) c; 2) b; 3) a; 4) d; 5) b; 6) a; 7) c; 8) c; 9) d; 10) c.

BONUS: To avoid confusion
1. Vertebrates—invertebrates
2. Cold-blooded—warm-blooded
3. Mammals, birds, insects, reptiles, amphibians, fishes etc.

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KANSAS FISH AND GAME

Supplementary Activities and Approaches

Listed below are approaches for using the student booklet and worksheets. Additional activities have been included for those teachers who are interested in furthering their study of wildlife. These activities can be done in a variety of curricula areas and are listed by subject. Basic skills will be practiced while students learn more about wildlife. Many of these ideas may already be familiar; others are new. A few of the activities were adapted from *Multidisciplinary Wildlife Teaching Activities*, by William Hernbrode, and *Sharing Nature With Children*, by Joseph Cornell. Check the Wildlife Reference Center for further activity sources. There are several excellent activity guides listed under Miscellaneous Books.

Language Arts

—The story script may be taped so that students may listen while they read.

—After reading the story, have your students make up their own stories or poems about the animals they have seen in the booklet. Students can act out their stories or draw pictures to express their ideas. Have the children think about what it would be like to live in a world without wildlife.

—The words in the script, and especially those listed on the vocabulary page, can be used on a spelling list. If you have an existing list, these could be added as bonus words. Or try scrambling the order of the letters of each word or putting the words into a word search.

—Use the booklet as a supplementary reading text to study compound words, blends, vowels, syllabication, affixes, parts of speech, etc.

—If you read daily to your class, why not include stories or poems about animals and the environment, especially those related to Kansas? Recommend your favorite selections to the school or public library for their future purchases. Refer students to books about wildlife when they need help in making a selection.

—Exchange letters with pen pals from a class in another state or region of Kansas. Choose an area that has habitat different from your area. Student's letters should include descriptions of wildlife and habitats near their homes. What are the similarities and differences? Photographs, illustrations, or samples of appropriate items may enhance the exchange.

—Have the students write an animal story or an informational article on an animal within the outline of the animal's body or track. Can the other students guess what animal this is?

—Play a modified version of charades. Have children take turns being the "describer." This person makes descriptive statements about the animals they have in mind. The rest of the class tries to guess what animal the describer is referring to. The first student to guess the correct answer becomes the next describer.

—Certain species of wildlife, such as spiders, bats, and snakes, have poor reputations among people. Students may work alone or in groups to design a campaign to improve the appeal of a particular creature. Often our fears are from lack of knowledge. Have the class conduct a survey to discover what students are afraid of and why. Discuss the results and compare the reasons for fear. How would the class combat these fears?

—Have students list what they think are the most important issues facing wildlife and the environment. Brainstorm solutions and necessary actions. Children should bring in magazine or newspaper clippings that relate to the list of topics. What legislation affects these problems? What can you do in your area to help?

—You are the first person to arrive in an area on this planet or another. You're lucky enough to find a creature that hasn't been seen by anyone else. Describe it in detail and classify it. Add an illustration so that classmates can try their hand at classification.

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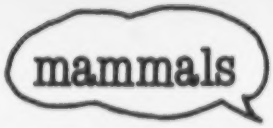
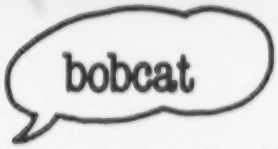
KANSAS FISH AND GAME





—Play an animal name game. Arrange children in a circle with one player in the middle. This center person points to a player and says, "mammal" (or bird, reptile, fish, insect, amphibian). The player must name an animal from the designated group by the time the center person counts to 10. An animal cannot be named twice. If a player is unsuccessful in naming an appropriate animal, he or she becomes the center person.

—While on an outdoor scavenger hunt, have students keep a look out for some of the following items. They should check these things off their list instead of bringing them back. This way the environment will not be disturbed.

—the smallest animal you can find in the area. Name it.
—an animal which recycles wastes from nature
—an animal with 6 legs
—an animal with 4 wings
—an animal that lives in dark places
—evidence that people and wildlife share the environment
—an animal that eats meat
—an animal that eats plants
—animal dropping (scat)
—a prey species
—a predator species
—a dead animal of any size
—a hiding place for an animal
—a crawling animal that will fly as an adult
—an animal that sings
—an owl pellet (take one apart and observe the contents)
—a sign that an animal was once here
—the biggest animal in the area. Name it.

—Groups of animals are often given a specific name such as a flock of doves or school of fish. The words used to name the animal groups sometimes describe the animals' behavior or appearance. See how many of the following group names can be identified to a particular species of animal. There may be others you'd like to add to the list. Herd, pod, knot, troop, army, crash, mob, business, and covey.

—Students can use their imaginations and have fun writing silly animal stories. Have them fill in the blanks to complete the following story. All the words should begin with the same first letter.

There once was a _____ named_____. Who always ate_____,_____, and_____. He/She went walking one day and saw a/an_____faraway. It was frightened by_____and _____, but was able to put up a fight.

His/Her favorite way to spend time was to_____,_____and _____.He/She was described by his/her friends as being_____,_____,_____, and _____. Who knows what will become of that _____!!

—Review basic reading skills using the following article and questions. Develop other questions to practice skills you are currently teaching.

ANIMALS FOR ALL SEASONS

If maternal care is one feature that wins some sympathy from us for our fellow mammals, another is the presence of the soft, attractive body covering that we call hair or fur. True hair, a nonliving derivative of the outermost layer of skin, is found only in mammals. Most species have both an underfur, consisting of a dense layer of short, fine hairs, and an array of longer, coarser guard hairs that extend above the underfur and usually contribute most to the color and pattern we see. Hairs are shed either throughout the year or all at once in annual or seasonal moults.

Hair's primary function is insulation. A covering of hair traps air and retards the loss of body heat. Combined with oil secretions from glands, hair helps to waterproof the body. Hair also helps an animal conceal itself. The coloration of most mammals, unlike that of many birds, is drab and lets the animal blend with the vegetation, soil, or light conditions. Some species, including certain North American hares, lemmings, and weasels, have brownish summer fur, which is replaced in the autumn moult by white fur for camouflage against snow. Hair also acts as a shield against skin injury, as a tactile device in the form of whiskers, as a defensive weapon when modified into quills or spines, and as a means of communication when formed into patterns that can be displayed to others.

Mammals that lack a covering of fur usually have gained other advantages. Sparsely haired armadillos, for example, have developed hardened skin for protection. No mammal goes an entire lifetime without some hair, though whales and porpoises may have hair only in the embryonic stage or, as adults, they may have just a few bristles around the mouth. For insulation, these sea creatures have evolved a layer of blubber which in some species may be up to 24 inches thick.

—Taken from Wild Animals of North America - National Geographic Society

Word Attack Skills — Use context clues to define the following words: Maternal, derivative, contribute, annual, primary, secretions, drab, moult, camouflage, tactile, defensive, modified, sparsely, embryonic, and insulation.

Circle all prefixes and box all suffixes. Write the base, or root words, at the side of the column. Select 10-15 words that have multi-syllables. Divide the words into syllables and show where the accents and other pronunciation marks should be placed. Check your work with a dictionary. List all the words that have the same vowel sound as bee, more, cat, and night.

Comprehension Skills — Define the word hair. What is the main purpose for having hair? Name the components of hair that most animals have. Why is the fur of most mammals brown, gray or another relatively dull color? When mammals lack an abundance of hair, what is one way they might meet their insulation needs? Why have sea creatures evolved to have blubber?

—Tap the creativity of your students by having them write wildlife limericks. In a limerick, lines 1,2, and 5 rhyme; and lines 3 and 4 rhyme. Place an example or two on the chalkboard or give them a beginning line to help get them started, such as:

There once was a hungry antelope
whose favorite food was cantelope . . .

Send copies of any of your best results to Joyce Harmon, Kansas Fish and Game, Pratt headquarters.

—Have the class list as many Kansas vertebrates and invertebrates as possible. Students draw from the list the name of one species. They are responsible to research their animal and come up with interesting information to be shared in the form of a poem, essay, or short story. Have the students use their creativity to go beyond biographical data.

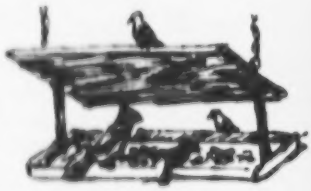
—Play charades with vocabulary words. Have students act out words such as hibernator, nocturnal, amphibian, etc. See how well the rest of the class can identify these nonverbal descriptions.

Science

—Students have learned how animals are adapted to their habitat. Humans are also adapted to their habitat. See how well your students will be able to "survive" if some of their adaptations are removed. Members of the class will be given a "handicap" of some sort. Some of the students should be blindfolded, others with fingers of one hand taped down, others with both hands taped, others with blindfolds and mittens on, and one group with no handicaps. Supply each student with an equal amount of peanuts. Observe their reactions and discuss what impact their handicap had on their ability to shell and eat the peanuts.

—Build a class terrarium so that children can observe animals such as snails, earthworms, beetles, etc. Children can observe the interaction of animals with plants. How are plants and animals alike, and how do they differ?

—Set up bird feeders on your schoolgrounds. Put individuals in charge of keeping the feeders full once the birds begin to depend on you for winter food. Have the students make observations of the different kinds of birds. How are they alike and how do they differ? Keep a record of the birds observed at the feeders. What are the favorite foods for each species? How do the birds differ in size and color? How are their beaks, legs, and feet different? Keep a scrapbook of pictures and stories of birds using your feeder.



—Do comparisons of animals by examining their eyes, ears, nose, teeth, hair or body covering, tracks, feet, bones, etc. Make a chart showing the similarities and differences.

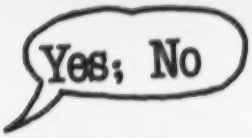
—Take advantage of your schoolground and surrounding area. You don't have to travel far to study the environment. Weekly hikes around the schoolyard can be very enlightening, especially if you select a topic or theme that will hold students' attention. Topics might include: animal homes, animal tracks and traces, animal sounds, birds, mammals, insects and other invertebrates, life on tree bark or other plants, cold-blooded wildlife (fish, reptiles, amphibians), spiders and their kin, predator-prey relationships, and life under a board or rock. Let the children come up with an occasional theme.

—Note the change of seasons and its impact on wildlife. Compare how cold-blooded and warm-blooded animals respond to the seasons. Consider some of the seasonal changes of animals such as hibernation, migration, reproduction, raising young, food storage, fat layer deposits, molting, adding thicker coats, color of fur, etc. Do you notice a change in the animals you see during each season? Observe road-killed wildlife during each season and see if you notice a change in kind or quantity of species at any particular season.

—Make an insect collection. Classify them into groups of helpful or harmful insects to humans. Check the library for techniques on pinning insects and on the use of a spreading board. Study and report on the life and habits of each insect. Include information such as: typical habitat selection; food preferences; methods of seeing, hearing, smelling, feeding, touching, and moving; and the stages of development from egg to adult.

—Classification can be an easier concept to grasp if students come up with their own techniques and put them to use. Size, color, feel, smell, quantity, texture, etc., can all be used to classify objects while on a hike. Have the students select one technique and become adept at it, then move onto using more than one technique at the same time such as, thin, long, green, soft, moldy plants.

—Observe decomposers on fallen logs, stumps, or in the humus. Why are these animals important? How do they fit into the food web? Make a food web to illustrate their importance.



—Review animal classification by playing "Who Am I?" Students wear an animal name tag on their back and must ask other students yes and no questions to discover their identity. Sample questions might include: Am I a vertebrate? Am I cold-blooded? Do I have 8 legs? Stress using questions that will force the players to review classification characteristics.

—To better understand the insect world, observe a variety of insects in your schoolyard. Attract them with strips of fabric soaked in sugar water or molasses. Attach the strips in several locations, such as the base of a tree, on a branch, on the ground, etc. Note whether the captured insects were flying or crawling insects. Notice the different sizes, shapes and adaptations. Compare insects from as many habitats as possible. Where did they find the most insects? Were more insects captured in dry or moist spots? If possible, check the strips at night as well as during the day.

—Mark off a 40- to 50-foot trail, and place 10 to 15 man-made objects along it. The children walk silently along the trail, trying to spot (but not pick up) as many of the objects as they can. When they reach the end of the trail, they whisper the number of objects they saw to you. If they missed any, see if they can find them on a second try. End with a discussion of camouflage, and natural and man-made things. What examples of camouflage did they find?

—Develop a habitat plot on your schoolgrounds. Prairie grasses and flowers can be obtained by gathering the seed heads at maturity. Trees, shrubs and other plants can be obtained from a local nursery; or they can be transplanted from another area in the fall or early spring. Use seed heads acquired from local farmers or seed stores to plant a food plot of sunflowers, milo, and millet for wildlife. Check with your local extension agent, soil conservationist, wildlife biologist or other conservation professionals for information and/or assistance. This ongoing project combines several disciplines in its scope and allows students pride in a project they can enjoy for years. One word of advice: Let your groundskeepers know of your plans, and fence off the area in some way to keep mowers from destroying your hard work. A sign explaining the project will let others in on what you're doing and could trigger further projects. How has your project changed the environmental quality of the area? Take an inventory of the wildlife in your study area. Do certain types of plants attract particular species? Develop a land use plan for your schoolgrounds and share it with the principal.

—Study the variety of ways that animals defend themselves. Gather as many examples as possible of teeth, claws, spines, antlers, horns, etc. Don't forget defense techniques such as mimicry, scent, feigning, stinging devices, and flight or running speed. Make a display of what you discover.

—Study decomposition and the cycles of producers, consumers and decomposers through an in-class observation. Place some soil and decaying leaves in a jar. Add water to keep the mixture wet. In one jar, place a small scrap of paper, in another jar place a chicken (or some animal) bone. Seal the jars and place them in a warm spot in the room. Check the decomposition process after one week, two weeks, etc. Discuss your observations. Note the change over time. What caused the change? Draw the cycle observed. How are decomposers important to us? What would result if decomposers were eliminated? A discussion of death as a natural part of the environment might follow. Further expansion on the topic of decomposition could include enclosing a variety of items from our everyday life in the jars and observing the results. What changes can be seen when plastic, metal, glass, cloth, chalk, or other items are "buried"? These items can actually be buried in a small plot on the schoolgrounds. Try placing an apple and a piece of bread outside, fastened to the ground with a stick, to see how long it will take for the food to disappear. Note the daily changes.

—Play the food web game. Each participant wears the name of a plant, animal, or element (air, sun, water or soil). The name tags can be decorated with a picture of the plant, animal, or element. The name tags are made from 5 x 7 cards and can be easily worn if a piece of yarn is attached to the corners of the card so that it will hang around the neck. Use animals and plants found in your area; some suggestions are: fish, cricket, snake, mosquito, owl, bluejay, turtle, bobcat, mushroom, trees, poison ivy, dandelion, etc. Have the group form a circle, standing close enough together so they can read the other name tags. The person labeled "SUN" begins the game. He or she hangs onto the end of the yarn and passes the ball of yarn to any other player who has a direct need for the sun. The player who receives the ball of yarn looks for a player he or she needs in order to survive, or a player who depends on him or her for survival. He or she holds onto the strand of yarn and passes the ball to that next player. As the game progresses, discuss the relationships between the members of the web. Try to get all the players involved, and discuss why the elements and lower level organisms seem to have more yarn in their hands (therefore needing to have more organisms at that level than at the upper level). Before enthusiasm wanes, discuss what impact people have on the food web. How does draining a marsh or pond, fire, disease, and restoring habitats affect the food web. Of course, we have some positive and negative impacts. The group might consider what they can do to keep the food web in a healthy state.

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KANSAS FISH AND GAME

—Invertebrates, especially insects, are plentiful in or around your schoolgrounds. Mosquitos, beetles, crickets, leaf miners, ants, worms, and spiders are fairly common in many areas. Have the children find as many different invertebrates as they can and observe these animals under a microscope. How are they adapted to their environment? What do they eat and how do they feed? Closely examine their sense of vision and touch. How do they move?

—Explain to the class what the word extrapolate means. Let them know you are going to give them opportunities to test their skills in extrapolating information. In a certain location in your classroom, place a portion of a picture, a descriptive statement or an object such as a feather, antler, bone, or piece of wood chewed by an animal. The item ought to give the students enough clues that they can eventually discover what wild animal this represents. Their guesses are placed in a box with the student's name on the paper. Answers are revealed each week and a new item replaces the old. Pictures might show the animal's feet, tail, or some other unique feature. A descriptive statement should give enough classification clues to direct the children's investigation.

—Have a "touch and see" table in your classroom with tree bark, rocks, bones, shells, etc. that your students can explore in their free time. Add items that the children bring in. If you don't have room for a table, have a "touch and feel" box of appropriate size. Cut an opening for hand and arm, and place objects inside that students may identify by touch only.

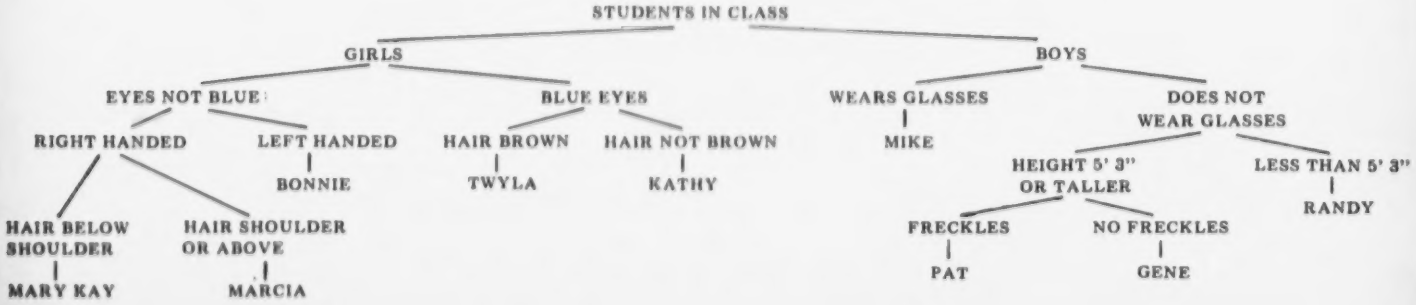
—Have an ant colony in a narrow glass case. Students can easily see the underground world of the ant. What do they eat? How do they communicate? How do they use their antennae? Go outside and locate ant colonies. Working in small groups, the children can follow the movement of their ants by marking their path. Or sprinkle chalk dust of different color over each ant colony and observe their movements. Do the colonies overlap territory? How far do they travel and how fast? Does one group of ants use the ant hills of another group?

—Study fish anatomy by examining small fish obtained from a local bait store. Explain that it is sometimes necessary for animals to die so that research and management activities can be carried out. It is important to note that death is an every-day occurrance in nature. Study circulation in the fish's tail by looking at it through a microscope. What can be seen that indicates the presence of the circulatory system? Open the mouth and gills of the fish. Students should be able to see through the mouth opening and out the gill slits. What does this indicate about how water is moved over the gills for breathing? With a sharp knife, make an incision from the bottom of the gill slit through the lower lip. Open the gill cover (operculum), and examine the gills. Why are they red? (filled with blood to carry oxygen) Why are the gill surfaces folded and textured? (more surface to take oxygen from the water)

—Have each child or small group locate an animal in or around the schoolground. They should observe the animal for 15 minutes, keeping notes of what occurs. Explain as many of the animal's actions as possible. Determine the animal's rate of movement. If possible, mark the movement pattern with a piece of chalk or with toothpicks placed in the ground as markers. Sketch the trail onto paper.

—Test your students' ability to observe when they are blindfolded. Given an object such as a rock, leaf, skull, or animal study skin, they need to describe this object using their available senses. Can they find their object when it is among a pile of similar objects? How closely did their blindfolded observations compare with the visual observations? Follow up with a study of geology if they are looking at rocks or study skeletal structure and adaptations if looking at skulls.

—One of the most visible ways to involve students in the construction of a key is one that deals with classification of students in the class. Have each child develop their own key so that each member of the class is identified. To save time, you might have them identify a smaller portion of the class. Below is an example of what the outcome may look like.



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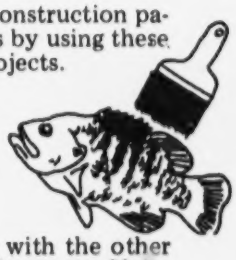
Art

—Design wildlife bookmarks, book jackets or bumper stickers. Cover surface with clear contact paper for durability.

—The worksheets include three-dimensional models. Run off copies of these pages on construction paper to add support to the model. See if you or your students can design other animals by using these as patterns. You may want help from volunteers when children are working on these projects.



—Make fish prints. Collect several small, whole fish that have scales, fins, and heads. Sunfish, bluegill, or crappie are good choices. The fish should be cold until you are ready to begin. Gently wash and dry the fish, being careful not to alter the scales or fins. Spray one side of the fish with hairspray. Use a flat, wide brush and carefully stroke acrylic paint over every part of the fish. Wipe color off of the eye and lift the fish onto clean newpaper, paint side up. Place a trial sheet of paper on top of the fish and hold it in place with one hand. Press down on the paper with the other hand, being careful to touch all body parts without letting the paper slip. Slowly lift the paper. If the print is blurred, too much paint has been used. The print will be faint if the paint was too dry or if too little paint was used. Paper towels may be used for trial printing. Parchment or cloth can be used to produce an interesting product.

—Make wildlife sculptures from tumbleweeds, sand, or snow. Paint the finished sculpture with dilute tempera in a spray bottle or with spray paint. Details can be added with a paintbrush or additional materials, such as fabrics.

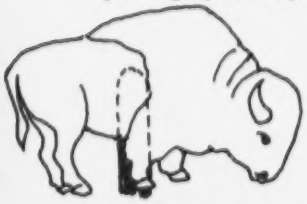
—Wild animals display not only a variety of colors and shapes, but also different patterns. Notice the interesting patterns in butterflies, fish scales, spider webs, feathers, etc. Combine these designs in a drawing or a painting.

—Select portions of animal illustrations that highlight unique characteristics of particular species such as the talons of an owl, antler of a deer, tail of a beaver, etc. Have students see how much information they can surmise on each species by just looking at the particular feature. They might include the identity of the animal, habitat selection and how the animal is adapted to its habitat, etc. Have the students complete a drawing for one or more of these animals.

—Make a set of animal posters. Students may work in groups assigning each group an animal class. Each group should include species appropriate to Kansas and a brief biography for each species.

—Make plaster casts of animal tracks. Begin by locating mammal or bird tracks. Make a collar from construction paper to surround the track so that the plaster is held in place. Combine plaster with water until a pancake batter consistency is reached. Place the collar around the track. Pour the plaster into the collar and wait 15 to 25 minutes for it to dry. A paper clip can be inserted in the plaster cast before it's completely dry, so that the finished cast can be hung on a wall. Identify the track with field guides. What can you tell about an animal from its track? A less messy alternative to plaster casts is recording tracks on smoked paper. Smoked paper can be made by holding paper over a burning candle, allowing carbon from the smoke to collect on the paper. Anything that touches the surface will leave a mark. Place the sheets in areas where animals are known to travel, or use bait to draw animals to the paper.

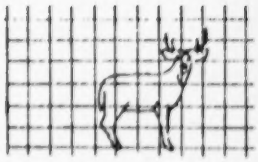
—Take photographs of wildlife in a variety of situations. If possible, develop your own black and white photographs. Explain the process of developing negative and positive images.



—Puppet plays allow students to creatively express their knowledge of a subject or several concepts. Have the children create puppets and put on plays for other students. The play topics might include: how wildlife would deal with a particular problem facing them, succession, animals finding a place to live, predator-prey relationships, food chains, etc. Appropriate background music can be played to add to the presentation.

—Build an animal home, such as a bird nest, by using materials students can gather on the school ground or in the classroom. Each student or group can build an animal home for their favorite animal or an imaginary one. Discuss what the animal's needs are. Compare the home with one built by an animal. How is the animal adapted for building its home? Add a challenge to this task by requiring that only the animal's beak can be used. Forceps or clothespins can serve as their beak.

—Build animal models from rocks or potatoes. Add pipe cleaners, construction paper, buttons, or natural objects, such as seeds and leaves, to complete the creatures.



—Allow children an opportunity to draw animals at a different scale. Trace the outline of one of the animals in the booklet onto grid paper. Give each child a copy of this illustration, and provide them with a sheet of grid paper of a larger or smaller scale. Their job is to reproduce the illustration at the different scale. Have them figure how many times larger or smaller their drawing is than the original.

—Students can construct aids for predation. Provide a wide variety of scraps, junk, scissors, glue, tape, string, paper, etc. Let them use their creativity to design some sort of mechanisms that will aid them in capturing food. The strategies used by predators varies widely. Suggestions can be made to direct those students who may need assistance. Such direction might include having their design be useful to catch a flying animal, an animal with a hard shell, a plant-eater, an insect-eater, a nocturnal animal, or an underground dweller. Have each child display his adaptation and describe how it works. What natural system already exists that uses the same general idea? Mother Nature seems to be one step ahead of us on creativity.

Industrial Arts

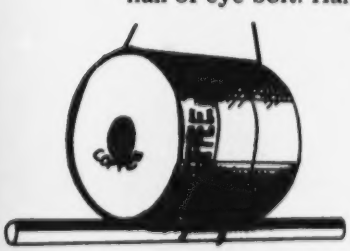
You can attract wildlife to your home and schoolyard if your provide habitat. Here are some easy-to-construct feeders that will bring enjoyment during the winter.

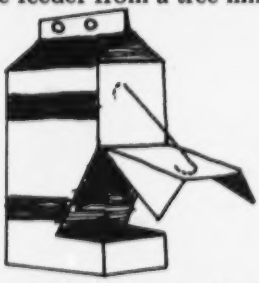
—Make a feeder for small birds with a coffee can, wire, and dowel or branch. Cut out the bottom of the can. Carefully cut a two-inch hole in the center of two plastic lids. Put the lids on the can. Hang the feeder horizontally by running wire through small holes in the lids and through the can. Attach a stick or dowel as a perch. Fill the lower half of the can with seeds, cereal, bread crusts, etc.

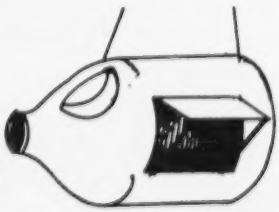
—Use a half-gallon milk carton for a feeder. Cut out an opening for feed about one and one fourth-inches deep. Hold up the roof with a straightened paper clip inserted in the side of the carton and the roof. Bend the clip to hold the roof in place. Reseal the carton with a stapler and hang with a wire, or set feeder on a windowsill. Small holes can be made in the bottom of the feeder to let rainwater out.

—Recycle detergent and bleach bottles to make feeders. Thoroughly clean the containers. Hang the detergent bottles vertically after cutting two circles the size of a 50-cent piece in their middles on each side. Slide a perch through nail holes below the opening. To make a horizontal feeder from a bottle, cut 6-inch long and 4-inch wide flaps in the side of the bottle. Prop these open with a twig. Attach a dowel or twig perch, and hang the feeder with wire.

—Two aluminum pie pans can be combined with one eight-to ten-inch dowel and two jar lids to make a feeder. Place a metal jar lid in the center of a large aluminum pan, and another inside a smaller pan. These lids will add weight and support to the feeder. Nail one end of the dowel to the small pan and lid arrangement. Attach the top of the feeder (large pan and lid) to the other end of the dowel with a nail or eye bolt. Hang the feeder from a tree limb or from the eave of your house.

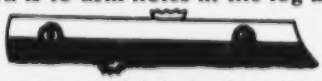






—Suet feeders are easy to make from an old onion bag or nylon net. Open the bag and fill it with suet (animal fat) from the grocery or meat market. Tie the bag shut and hang it from a tree branch.

—Build a log feeder from a dead branch about 15 inches long and 3 inches thick. Nail bottle caps onto it. Attach an eye bolt into the top of the log to hang the feeder vertically. Fill the caps with a peanut butter and bird seed mixture. An alternate method is to drill holes in the log and fill them with a mixture of bird seed, peanut butter, and ground suet.



It is very important to continue feeding the birds once you begin in the winter. Birds will learn to depend on you for food until they find other sources of food in the spring. If you stop feeding during the cold weather, the birds may suffer.

—Keep a record of the birds you see and their behavior. What are the different birds' favorite foods? Have the class bring in leftover bread crusts, oatmeal, corn, unsugared cereals, etc., to fill the feeders. Most meat markets will give suet away or sell it inexpensively. Ground suet is a good addition to the seed mixtures. The fat will help the birds withstand the winter cold.

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Mathematics

—Divide the class into teams to count vertebrates and invertebrates. Count the number of different invertebrates and vertebrates found in a square foot of the schoolyard. Estimate the number living in a city block. Estimate the number living in an equivalent area of woodland or prairie. Compare the quantity and diversity between city, woodland, and prairie plots.

—Size can be an abstract concept unless it is visually displayed. Students can grasp the size of many units of measurement, such as an acre or the size of animals, if they are marked off on the school grounds. For animal measurements, use a field guide or other resources to get accurate height, length, and weight measurements. How tall is an antelope? How long is an average adult rattlesnake?

—Species diversity is one measure of the stability of a community. The greater the diversity, the more stable the community. Measure the species diversity on several sites of the schoolground by using the following formula.

$$\text{Diversity} = \frac{\text{Total number of species}}{\sqrt{\text{Total number of individuals}}}$$

Have the students work in small groups, applying this formula to a square meter plot. What factors are involved in the differences in diversity throughout the schoolground? Where is the species diversity the highest? How does plant diversity affect animal diversity? How does this number vary throughout the seasons?

—Some animals can be helpful in determining the approximate temperature. During warm weather, certain insects chirp rapidly and at a high pitch. In cooler temperatures, the chirps slow down. Use the following formulas on a day when the temperature is between 55 and 100 degrees Fahrenheit.

T=Temperature
C=Number of chirps in 60 seconds

$T = 50 + \frac{C - 40}{4}$ House Cricket $T = 60 + \frac{C - 19}{3}$ Katydid $T = \frac{50 + C - 90}{4.7}$ Tree Cricket

Reverse the problem to determine C. Take the temperature where the insect is located. What does this exercise demonstrate about insects and their relationship with the environment?

—Estimates of populations can be figured using a technique called the Lincoln-Petersen Index that will allow students to work with ratios. This technique can be practiced using beans or some type of playing chip, and later expanded to real wildlife populations. Mark off a one or two square meter plot for each small group of students. Deposit an unknown quantity of beans in the plot. Give the students 30 seconds to "capture" all the beans they can find. Count the beans and mark those beans with a magic marker. Throw the "captured" beans back in the plot. Once again, allow the students to capture individuals and count the captured. How many of these individuals were marked from the first capture? Figure the Lincoln-Petersen Index using one of the following formulas:

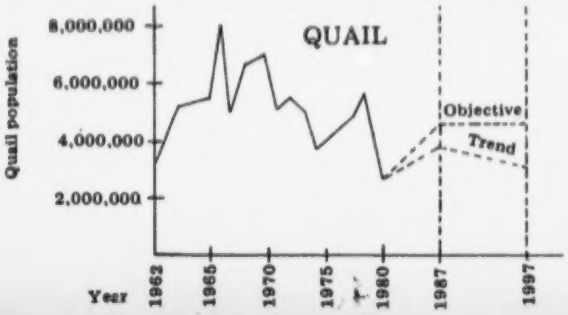
$$\frac{\text{Population Estimate}}{\text{Total Number of Individuals Captured the First Time}} = \frac{\text{Total Number of Individuals Captured the Second Time}}{\text{Number of Marked Recaptured Individuals}}$$

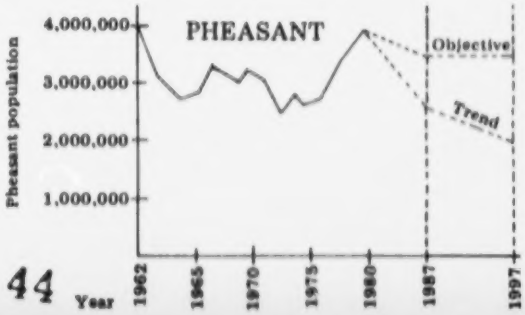
or

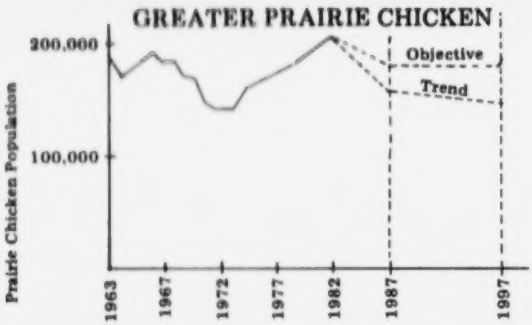
$$\text{Population} = \frac{\text{(Number caught first time) x (Number caught second time)}}{\text{Number of Marked Recaptured Individuals}}$$

What problems might arise when biologists use this technique?

—Pheasants, quail, and prairie chickens are popular game birds in Kansas. Use the following graphs of Kansas data to answer math-related problems.







1. What is the approximate current population for each species? Which of the three species is most plentiful?
2. What is the objective and trend figure for each species in 1987? What is the difference for each? What strategies would you use to meet the objectives?
3. What five year span showed the greatest change for each species?
4. What is the average population of each species from 1962 to the current year?

Social Studies

—Learn more about the seasons by keeping a record of changes throughout the year. Have the class pick a special spot on the schoolgrounds, or allow each child his or her own location for making observations. Observe the changes that take place through the year. How do shadows change with the time of day and season?

—Wildlife is a renewable resource, as are many other components of the environment, such as trees. Certain numbers of wild animals and trees can be removed each year, because they will be replaced in the future. Humans tend to use resources without really thinking about the impact on the environment. Make a list of those things that you use daily, such as pencils, food, paper, etc. Trace the processing path to the original source of each item. Which ones are from renewable resources, and which are from nonrenewable resources? What ideas do you have to better conserve all of our resources? What is a good definition for "conservation"? Have each child write their own motto to live by, for environmental ethics. Our actions have an impact on the environment. We can determine to what extent the impact is positive or negative.

—Wild animal and human behaviors differ a great deal in some ways, but have definite similarities, especially when dealing with basic needs. Have students think of some wild animal behaviors and associate them with a similar human behavior. Examples might include: wildlife cleaning feathers or fur—humans keeping clean and using beauty parlors, laundromats, dry cleaners, etc., both wild animals and humans build homes, and both obtain food. Have students use their imaginations to come up with a variety of behaviors. Are there some that don't seem to match up? For fun, have the children write a job description, résumé and want ad for a particular animal such as: EXPERIENCED DIGGER NEEDED — Night work may be required, danger of nearby badger, excellent wages and benefits. Apply at Pocket Gopher's Unlimited, Inc.

—Have students classify activities in the area around your school and/or their neighborhoods to fit under one of the following categories: Healthy, Unhealthy or Dangerous to the environment and to them. Discuss your lists and possible changes that can be made.

—People use natural resources at a fast rate. Recommend to your students that they recycle and conserve natural resources as much as possible. Organize a paper or aluminum recycling project for your school or district.

Music

—Write new wildlife-related lyrics to old songs.

—There are many songs dealing with the environment or specific animals, such as "The Ants Go Marching." Find some other songs that deal with wildlife, or put a poem to music. Contact the Missouri Department of Conservation, P.O. Box 180, Jefferson City, Missouri 65102, for their song book, Missouri Conservation Melodies. There is a charge for this valuable book and accompanying cassette tapes.

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—Make a cassette tape of animal sounds. Bird songs are available through the Wildlife Reference Center. See if students can identify some common calls or songs. Tap out the rhythm of the animal sounds on your desk top or by clapping your hands.

—Have the children listen to bird or other animal sounds. Then have them design an animal they think would make that sound, and compare the real animal with the imaginary one.

—Some birds, such as the mockingbird, can imitate other birds. How well can you "mock" bird songs? Put words to the beat of the bird songs and calls. Can you tell by listening to the sounds if the birds are using their voices to establish territories, attract a mate, or sound danger?

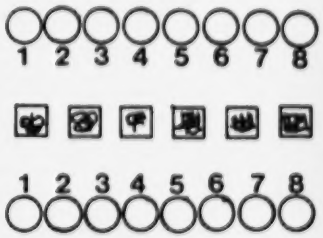
—Which animals would make good sopranos, altos, tenors, or basses? Listen to tapes, records or the animals themselves while on a walk.

—Some animals make specific calls, warning signals, or songs. Design instruments that sound like animals. Use wood, sandpaper, glue, construction paper, and odds and ends to create the sound.

Physical Education

—The concept of predator-prey can be acted out through "Hawk & Mice". One player is the hawk, or predator. The other players are mice, or prey; running, jumping or playing in a field. The hawk selects a particular mouse to prey on and quietly tells a referee. The hawk dives down on its prey while the mice attempt to guess which mouse will be selected. The mice try to second guess the hawk by forming a circle around the mouse they think has been selected. If correct, the mice are safe. If incorrect, the hawk announces the correct prey. This mouse then becomes the hawk. A variation that teaches the same concepts can be played by dividing the group into two groups so that one-third of the class are hawks and two-thirds are mice. The only way the animals can move is by following a particular pattern, such as hawks moving by taking two long steps and one hop, over and over. Mice move by taking two hops, one small step and a long step, over and over. If a hawk touches ("eats") a mouse, he/she sits down. Give the group a chance to practice, then allow them five minutes to either catch their food or hide from predators. The hawks need to catch at least three mice within the playing time to survive.

—Students can express animal behavior and movement by playing a passenger on Noah's Ark. Count the number of children present. Write a list of animals that is half the number of children. Write each animal twice so that the players will have partners ("two by two"). If there is an odd number, have one group of three. Distribute the animal names at random in "closed ballet" form. The children now become the animal, mimicking its actions. They find partners of the same species by observing the movements, sounds, and appearances of the other animals. No talking is allowed. When partners have found each other, they stand quietly together.



—The class forms two teams, and each team counts off. The teams face each other from either side of the play area, with pictures of animals mentioned in this unit on a center line. The instructor says the name of one of the animals, then calls a number. The two children with that number run to the correct picture, try to get it, and return to their place in line. The picture is replaced and play continues. The instructor keeps score. Add a challenge by having the player who does not reach the picture first attempt to tag the other player before he or she returns to home base. If the player is not tagged, the team gains two points; if tagged, one point.

—Have each student select the name of a favorite Kansas animal. A name can be used by more than one student. The players line up at one end of the playing area. One child is the chaser and calls out the names of Kansas animals. When a player's name is called, he/she must run to the other end of the playing area, trying not to get caught by the chaser. If caught, the player becomes an additional chaser. When all names have been called, the chasers call the names of those players who weren't caught. Play continues until all players are caught.

—Divide the class into groups of approximately 5. Each group is given the name of an animal or chooses their own. The group combines to form the animal. The rest of the class tries to guess what animal the group is portraying.

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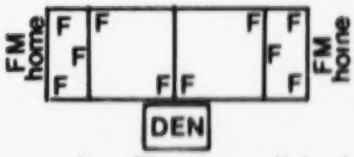
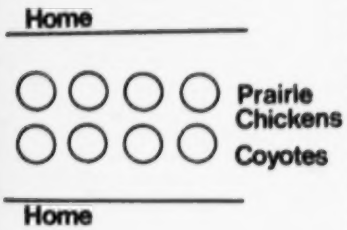


—Play "Fox and Field Mice". Ten children become foxes; others are field mice. They stand in the boundaries as shown in the diagram. Foxes may run from side to side but not out of their boundary line. The field mice line up at the starting line and try to make it to the finish line without being tagged by a fox. As many as four field mice may run at one time. Field mice are safe at home or while standing on any line. They can walk back and forth on the line, waiting to escape. If caught, the field mice sit in the den. Start a new game when several field mice have made it safely home, or when several are captured in the den. Have the field mice and foxes reverse roles.

—Play "Producers-Consumers". Two people are the "sun". The remaining students are "producers" or "consumers" (about 1 consumer to every 2 producers). The sun players have a handful of marbles (energy). They are attempting to reach the producers, and give them a marble, without being tagged by a consumer. If tagged, they have to give up one marble to the consumer and continue on their way. The producers are also trying to avoid being tagged by a consumer. If tagged, the producer stands still. At the end of play see how many marbles the producers and consumers have. Discuss what happens when there are more consumers than producers.



—Review what you've learned about wildlife and get some exercise by playing "Prairie Chickens and Coyotes." Divide the class into two equal teams. One group is The Prairie Chickens; the other is The Coyotes. The teams line up facing each other about 3 feet apart. Home territory is marked with a line 15 feet behind each team. The group leader or teacher makes a statement such as, "Wildlife needs water, food and cover to live." If the statement is true, the Coyotes chase the Prairie Chickens, trying to catch them before they reach their home territory. If the statement is false, the Prairie Chickens chase the Coyotes. Any players who get caught become members of the other team. Some questions might cause confusion. The leader should stay quiet until after the commotion has ended and then discuss the answer with the group.

—There are dances named after animals, such as the bunny hop and the fox trot. Try creating your own animal dances. Begin by demonstrating and practicing the bunny hop and fox trot. Give each group of 5 children an animal dance name, such as Buffalo Bump, Squirrel Swing Step, Rattlesnake Rumba, Porcupine Polka, Turkey Two-Step, Catfish Crawl, or Turtle Tango. Each group performs its dance in front of the class using the music of its choice. Stress that students use creativity in developing their dance.

—This activity should be done outdoors or in a large, open space. Have each child secretly write the name of a plant or animal that lives in the area. The players are going to build a pyramid; but don't tell them that until you've collected the papers. Get the class thinking about food pyramids by asking questions such as, "What form of life is the first to use the sun's energy?" (Answer: Plants.) The fun begins when you start to build the pyramid and the plants realize their fate. The plants will be on the bottom of the pyramid because all animals depend on them directly or indirectly for food. The plants kneel down on all fours, close together in a line. All the plant-eaters (herbivores) stand in a line behind the plants. All the meat-eaters (carnivores) stand in a line behind the herbivores. There will nearly always be more children in the upper level groups than in the supporting plant groups. (It seems much more fun to be a bobcat or coyote than it is to be a dandelion or muskrat.) With so many on top and so few for a base, it will be very difficult to build a stable pyramid. Some of the predators will have to change their position. Challenge the children to reconstruct a pyramid that will support all its members. The larger children can become plants, and any omnivores (animals that eat both plants and animals) can be herbivores. The higher up on the food chain, the fewer the number of animals there are. Demonstrate the importance of plants by threatening to pull one of them out of the pyramid.

—Take a "blind trust" walk. Students work with partners, each having a chance to be blindfolded. While "blind" they are carefully led to explore surrounding areas using their other senses. The leader may have the blindfolded person experience touching a feather or tree bark, smelling the soil, listening to the wind, etc. A group can be led together by having participants hang onto a rope throughout the course. Conclude the activity by seeing if the participants can retrace their steps when the blindfolds are removed.

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Resources and References

etc... ...Appendix

Locate the Fish and Game Commission office closest to you. The office personnel may be of help, and most offices have free informational brochures.

Pratt Headquarters
Kansas Fish & Game Commission
RR 2, Box 54A
Pratt, Kansas 67124
316/672-5911

NC Regional Fish & Game Office
511 Cedar, Box 489
Concordia, Kansas 66901
913/243-3857

Downs District Office
Highway 24E
Downs, Kansas 67437
913/454-6315

Ellsworth District Office
North Main & West Douglas
Ellsworth, Kansas 67439
913/472-4290

Wakefield District Office
Wakefield, Kansas 67487
913/461-5402

NE Regional Fish & Game Office
3300 SW 29th
Topeka, Kansas 66614
913/273-6740

Blue Rapids District Office
801 S. Main
Blue Rapids, Kansas 66411
913/226-7509

Kansas City District Office
Clover Leaf Bldg. 1, Suite 221
6811 W. 63
Shawnee Mission, Kansas 66202-6024
913/722-6024

Lawrence District Office
512 E. 9th
Lawrence, Kansas 66044
913/842-5784

Manhattan District Office
Rt. 6
Manhattan, Kansas 66502
913/539-9479

Osage District Office
Osage State Fishing Lake
Box 303
Carbondale, Kansas 66414
913/665-7341

Valley Falls District Office
415 Broadway, Box 88
Valley Falls, Kansas 66088
913/945-3373

NW Regional Fish & Game Office
Route 2
Hays, Kansas 67601
913/628-8614

Colby District Office
190 Franklin, Box 366
Colby, Kansas 67701
913/462-3367

Stockton District Office
Division of Water Resources Building
425 Main
Stockton, Kansas 67669
913/425-6212

SC Regional Fish & Game Office
204 W. 6th, Box 764
Newton, Kansas 67114
316/283-2482
(Office will move to Valley Center on east K-164 after July 1985)

El Dorado District Office
2435 W. Central
El Dorado, Kansas 67042
316/321-6750

Emporia Wildlife Investigation Office
832 E. 6th
Emporia, Kansas 66801
316/342-0658
(Office will move to ESU campus after 6/85.)

Eureka District Office
300 W. Second
Eureka, Kansas 67045
316/583-6092

Wichita Urban-Metro Office
27th and Arkansas, Box 4034
Wichita, Kansas 67204
316/832-9787

Winfield District Office
Room 418, Winfield State Bank Building
Winfield, Kansas 67156
316/221-7110

SE Regional Fish & Game Office
222 W. Main Building, Suite C & D
Chanute, Kansas 66720
316/431-0380

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Independence District Office
805 Crescent Drive
Independence, Kansas 67301
316/331-6820

Mound City District Office
Box 331
Mound City, Kansas 66056
913/795-2218

New Strawn District Office
Box 103
New Strawn, Kansas 66839
316/364-2282

Pittsburg District Office
Route 2, Box 372 AAA
Pittsburg, Kansas 66762
316/231-3173

SW Regional Fish & Game Office
808 Highway 56
Dodge City, Kansas 67801
316/227-8609

Cheyenne Bottoms Waterfowl Mgmt. Area
Route 3
Great Bend, Kansas 67530
316/793-7730

Garden City District Office
South Star Route
Garden City, Kansas 67846
316/276-8886

KANSAS WILDLIFE Magazine
A bi-monthly publication
available from the
Pratt headquarters.
$6.00 - 1-year subscription
$11.00 - 2-year subscription
$15.00 - 3-year subscription
(Prices subject to change.)

There are several other excellent sources of information on environmental topics available in Kansas and nationally. The organizations provide materials, speakers, or services on environmental education. This list is not complete. Make additions where appropriate.

Kansas Organizations

American Camping Association
Missouri Valley Section
4201 W. 15th Street
Topeka, Kansas 66604

Dillon Outdoor Education Center
3002 East 30th
Hutchinson, Kansas 67501

Environmental Education Curriculum Materials Center
Education Division
Farrell Library, Kansas State University
Manhattan, Kansas 66502

Great Bend Zoo
City Park
Great Bend, Kansas 67530

Kansas Academy of Science
Department of Biology
Emporia State University
Emporia, Kansas 66802

Kansas Advisory Council for Environmental Education
(Contact the State Department of Education
Science coordinator, or State and Extension
Forestry for information.)

Kansas Association of Conservation Districts
Route 1, Box 32
McPherson, Kansas 67460

Kansas Bass Chapter Federation
(Write to Kansas Fish & Game Commission
RR 2, Box 54A, Pratt, Kansas 67124
Fisheries Division for address of
current Youth Director.)

Kansas Canoe Association
2319 Terry Way
Manhattan, Kansas 66502

Kansas Energy Office
214 W. 6th
Topeka, Kansas 66603

Kansas Geologic Survey
1930 Avenue A, Campus West
University of Kansas
Lawrence, Kansas 66044

Kansas Herpetological Society
Museum of Natural History
University of Kansas
Lawrence, Kansas 66045

Kansas Ornithological Society
Department of Biological Sciences
Fort Hays State University
Hays, Kansas 67601

Kansas Outdoors Unlimited
P. O. Box 470
Herington, Kansas 67449

The Kansas School Naturalist
Emporia State University
Division of Biological Sciences
Emporia, Kansas 66801

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Kansas Water Office
Suite 503, Kansas Avenue
Topeka, Kansas 66603

Kansas Wildflower Society
c/o Washburn University
Mulvane Art Center
Topeka, Kansas 66621

Kansas Wildlife Federation
P. O. Box 720
Junction City, Kansas 66441

Lee Richardson Zoo
Finnup Park
Garden City, Kansas 67846

Museum of Natural History
University of Kansas
Lawrence, Kansas 66045

Sedgwick County Department of Environmental Resources
Historic County Courthouse
510 N. Main Street
Wichita, Kansas 67203

Sedgwick County Zoo
5555 Zoo Boulevard
Wichita, Kansas 67212

Soil Conservation Service
USDA
P. O. Box 600
Salina, Kansas 67401

State Biological Survey
2045 Avenue A, Campus West
Lawrence, Kansas 66044

State Conservation Commission
Room 1014, 535 Kansas Avenue
Topeka, Kansas 66603

State Department of Education,
Science, Math & Environmental Education
120 East 10th Street
Topeka, Kansas 66612

State Department of Health & Environment
Forbes Field, Building 740
Topeka, Kansas 66620

State Extension Services
Kansas State University
Umberger Hall
Manhattan, Kansas 66506

State and Extension Forestry
Kansas State University
2610 Claflin Road
Manhattan, Kansas 66502

State Park & Resources Authority
503 Kansas Avenue
P. O. Box 977
Topeka, Kansas 66601

Topeka Zoological Park
635 Gage Boulevard
Topeka, Kansas 66606

Wildlife Society Kansas Chapter
(Contact Kansas Fish & Game Commission,
RR 2, Box 54A, Pratt, Kansas 67124
for current president's address)

National Organizations

American Fisheries Society
5410 Grosvenor Lane
Bethesda, MD 20814

American Fishing Tackle Manufacturers Association
20 N. Wacker Drive
Chicago, IL 60606

American Forest Institute
1619 Massachusetts Avenue, N.W.
Washington, D. C. 20036

Boy Scouts of America
National Office
1325 Walnut Hill Lane
Irving, Texas 75062

Bureau of Land Management
U. S. Department of Interior
Washington, D. C. 20240

Center for Action on Endangered Species
175 West Main Street
Ayer, Massachusetts 01432

Center for Environmental Education
625 Ninth Street, N.W.
Washington, D. C. 20001

Ducks Unlimited, Inc.
P. O. Box 66300
Chicago, Illinois 60666

DU Kansas Regional Office
1004 West Ninth
Pratt, Kansas 67124
(check local chapter)

Environmental Protection Agency
401 M Street, S.W.
Washington, D. C. 20460

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ERIC Clearinghouse for Science, Mathematics, and Environmental Education
The Ohio State University
School of Natural Resources
1200 Chambers Road, 3rd Floor
Columbus, Ohio 43212

Forest Service
U. S. Department of Agriculture
P. O. Box 2417
Washington, D. C. 20013

The Garden Club of America
598 Madison Avenue
New York, New York 10022
(check local group)

Girl Scouts of the U.S.A.
830 Third Avenue
New York, New York 10022
(check local group)

Izaak Walton League of America
1800 North Kent Street, Suite 806
Arlington, Virginia 22209
(check local group)

National Association of Biology Teachers
11250 Roger Bacon Drive
Reston, Virginia 22090

Kansas Association of Biology Teachers
(Contact State Department of Education Science Coordinator for current address.)

National Association for Environmental Education
P. O. Box 400
Troy, Ohio 45373

National Audubon Society
950 Third Avenue
New York, New York 10022

Kansas Regional Office
813 Juniper Drive
Manhattan, Kansas 66502
(check local group)

National Park Service
U. S. Department of Interior
Interior Building
Washington, D. C. 20240

National Science Teachers Association
1742 Connecticut Avenue, N.W.
Washington, D. C. 20009

State Chapter
Kansas Association of Teachers of Science
Contact: State Dept. of Education Science Coordinator for information

National Shooting Sports Foundation
1075 Post Road
Riverside, Connecticut 06878

National Wild Turkey Federation
Wild Turkey Bldg., P.O. Box 530
Edgefield, South Carolina 29824

National Wildlife Federation
1412 16th Street, N.W.
Washington, D. C. 20036

The Nature Conservancy
Suite 800, 1800 N. Kent Street
Arlington, Virginia 22209

Natural Science for Youth Foundation
763 Silvermine Road
New Canaan, Connecticut 06840

Quail Unlimited
P.O. Box 10041
Augusta, Georgia 30906

Safari Club International
5151 E. Broadway, Suite 1680
Tucson, Arizona 85711

Sierra Club
530 Bush Street
San Francisco, California 94108
(check for local group)

Smithsonian Institution
1000 Jefferson Drive, S.W.
Washington, D. C. 20560

Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 2890
Washington, D. C. 20013

Sport Fishing Institute
Suite 503
719 13th Street, N.W.
Washington, D. C. 20005

U. S. Fish and Wildlife Service
Department of the Interior
Washington, D. C. 20240

The Wilderness Society
1901 Pennsylvania Avenue, N.W.
Washington, D. C. 20006

Wildlife Management Institute
709 Wire Building
1000 Vermont Avenue, N.W.
Washington, D. C. 20005

The Wildlife Society
5410 Grosvenor Lane
Bethesda, Maryland 20814

wildlife education service

Glossary

Many of the terms below have been defined in the booklets or worksheets in the preschool through sixth grade units. Other words may come up in conversations with students or in your research. Check an ecology or biology book for further definitions and information. Definitions are taken from context of use in texts and the following sources:

Multidisciplinary Wildlife Teaching Activities, by William R. Hernbrode; *Project Learning Tree*, by the American Forest Institute, Inc.; and *The Random House Dictionary of the English Language, College Edition.*

ACRE—A unit of land equal to 43,560 square feet or 1/640 square mile.

ADAPT—To make suitable to environmental conditions; adjust.

AMPHIBIAN—Cold-blooded vertebrates that are covered with moist skin and live partially in an aquatic habitat and partially on dry land. This group includes frogs, toads, and salamanders.

ANNUAL TURNOVER—The rate of replacement of individual animals in a population. Bobwhite quail may have a 70 percent annual turnover. Only 30 percent of the birds alive at the beginning of the year are alive at the end of the year.

ANTLER—Bone-like growth on members of the deer family that falls off and grows back each year. Horns differ from antlers because they do not fall off each year. A few horned animals drop the outside sheath of the horn (such as antelope).

AQUATIC—Living or growing in water.

ARACHNID—Any arthropod in the class *Arachnida*. Includes spiders, scorpions, mites, ticks, etc.

BAG LIMIT—The number allowed to be harvested in regulated hunting and fishing. A hunter may remove four pheasants each day. This is a bag limit.

BIG GAME—Large, hunted animals, such as antelope and deer. Examples of small game are rabbits, squirrels, pheasants, quail, etc.

BIOME—A complex of communities characterized by a distinctive type of vegetation and maintained under the climatic conditions of the region.

BIOTIC COMMUNITY—The living organisms in a community. Includes all plants and animals in the community. The non-living parts would be the abiotic parts of the community.

BLIND—A hiding place for observing or photographing.

BOOMING GROUND—An area in the prairie used by prairie chickens for their mating dance. The male birds make a booming sound while they dance to attract females.

BOTTOMLAND—Low-lying land, usually near a river.

BOUNTY—An old practice of paying for removing certain animals. This was thought to be useful in reducing pest animals but proved to be impractical.

BROWSE—This word can be a noun or verb. Brushy vegetation used by animals as food (noun). To eat the twigs and leaves of woody, brushy plants (verb). Deer, elk, and moose are browsers.

BRUSH PILE—Branches and other vegetation piled together for wildlife cover.

BURROW—A hole or tunnel in the ground made by a small animal for habitation and refuge.

CAMOUFLAGE—Color and/or pattern that blend into the environment.

CARNIVORE—Meat eater.

CARRION—Dead animals in the process of decaying. Crows feed on carrion.

CARRYING CAPACITY—The number of animals of a species that can be supported in a particular habitat at any given time. This number will change with the season, and from year to year. It depends on competition from other animals, rainfall, and other weather factors.

CHANNELIZATION—Changes made to a river bed to straighten, widen, or deepen it. Used in land reclamation, and mistakenly used in flood control attempts but is very harmful to the river habitat.

CLASSIFICATION—The assignment of plants and animals to groups within a system of categories distinguished by structure, origin, etc.

CLEARCUT—A logging practice that removes all the trees in an area.

COLD-BLOODED—Describes animals that change body temperature to match their surroundings.

COMMUNITY—A group of plants and animals living in a particular location and interacting with each other.

COMPETITION—Struggle among organisms for food, space, cover, and other requirements for existence.

CONSERVATION—The wise use of natural resources to assure their presence in the future.

CONSUMER—Uses plants or animals as food. Eats producers. A primary consumer, such as a rabbit, eats plants. A secondary consumer, such as a fox, eats primary consumers.

COVER—Shelter provided by vegetation, debris, and irregularities of the land. Used by wildlife for sleeping, hiding, feeding, and breeding areas.

COVEY—A small flock or group. Quail are often found in a covey.

CRITICAL HABITAT—Includes the areas of land, water, and air space occupied by an endangered species at the time this species is listed. This habitat is classified by the federal government as being necessary for the species' survival.

CRUSTACEAN—Any chiefly aquatic arthropod of the class *Crustacea*. Usually has a hard shell or crust covering the body. Includes lobsters, shrimps, crabs, barnacles, etc.

DABBLING DUCKS—Ducks that live near shallow marshes, ponds, and rivers. They tip their tails up to feed, with the majority of their bodies above water. These ducks take off in vertical flight when startled. Also called "puddle ducks."

DECOMPOSER—Plants and animals that feed on dead material and cause it to mechanically or chemically break down. Examples include bacteria, fungi, and earthworms.

DEN—A secluded place, as the lair of a predatory animal.

DINGELL-JOHNSON FEDERAL AID IN FISHERIES RESTORATION ACT—D-J funds provide federal cost shares for fisheries projects. Funds provided by an excise tax on some fishing equipment.

DIURNAL—Active during the day. Opposite of nocturnal.

DIVING DUCKS—Ducks that prefer deep water as in lakes and bays. They feed by diving below the surface and take flight from a running start.

DOMESTIC ANIMALS—Animals of the home or farm, such as dogs, cats, chickens, etc.

ECOLOGY—The scientific study of the relations of living things to one another. A scientist who studies these relationships is called an ecologist.

ECOSYSTEM—A system formed by the interaction of a community of organisms with each other and their nonliving environment.

EDGE EFFECT—The tendency of wildlife to concentrate at the edges of two adjacent vegetative or land use types. The combination of habitats provides extra food and shelter.

ENDANGERED—Species that are in danger of becoming extinct throughout all or a significant portion of their range.

ENVIRONMENT—The total of all surroundings including air, water, plant life, people, and wildlife. Physical and biological factors included.

ESTIVATE (Aestivate)—To spend the summer in a torpid, or dormant, condition.

EXOTIC—In conservation terminology, this refers to a foreign plant or animal that has been introduced into a new area. The ring-necked pheasant is an exotic introduced to the U. S. from Asia.

EXTINCT—Species that no longer exist. Examples include passenger pigeon, great auk, and the sea mink.

EXTIRPATED—Describes species that were removed in a particular area but are found elsewhere. Mountain plover were extirpated from Kansas and have only recently been reintroduced.

FENCEROW—Vegetation growing along a fence. Often used by wildlife for cover.

FISH AND GAME COMMISSION—Organization that has responsibility for the wildlife and habitat in the state. Each of the 50 states has a similar organization.

FLYWAY—Flight routes used by migratory birds. Kansas is in the Central Flyway.

FOOD CHAIN—The sequence by which energy is passed from sun to plants to animals. A green plant is eaten by an insect that is eaten by a bird, forming a simple food chain.

FOOD WEB—An interconnection of food chains.

FORAGE—Used as a verb and a noun. Refers to vegetation taken by herbivores (noun). Act of taking the vegetation (verb).

FORBS—For wildlife use, forbs are weeds and herbs, low-growing annual or perennial herbaceous plants.

GAME—Animals that can legally be hunted, fished, or trapped.

GENUS—Used in plant and animal classification as the subdivision of families or subfamilies. A genus usually has more than one species. The genus *Canis* includes dogs, wolves, coyotes, etc.

GRANIVORE—Grain eater.

HABITAT—The place in which an animal lives. It must include food, water, and cover. This involves escape cover, winter cover, cover to rear young, and space to play. Loss of habitat is the biggest single threat to wildlife.

HARE—Rodent-like mammals of the genus *Lepus* having long ears, a divided upper lip, and long hind limbs adapted for leaping. Distinguished from rabbits by having young that leave the nest in 24 to 48 hours. Hares are generally larger than rabbits. Jack rabbits are hares.

HERBIVORE—Plant eater.

HIBERNATE—Spending winter, or a portion of it, in a state of sleep; a torpid or resting state.

HUNT—To search for game animals for the purpose of catching or killing. Hunting is now regulated under comprehensive laws in every state. Sport hunting removes the surplus of wildlife as opposed to market hunting in pioneer days when nearly all edible or useful forms of wildlife were taken almost without restriction.

INTERACTION—The relationship of one organism to another. The action of one population affecting the growth or death rate of another population. One population may eat members of other populations, compete for food, etc. Interactions can be positive, negative, or neutral.

INTERDEPENDENCE—The interrelationships of wildlife with one another and with the various elements of their environment.

INTERSPERSION—Mixing of habitat types. Interspersion of habitat creates edge.

INVERTEBRATE—Animal without a backbone.

KINGDOM—A province of nature. The animal, vegetable, and mineral kingdoms.

LARVA—Immature, wingless, feeding stage of an insect that undergoes complete metamorphosis. Also, the young of any invertebrate.

LIFE CYCLE—The continuous sequence of changes undergone by organisms from one primary form to the development of the same form in a subsequent generation. Immature animals grow, reproduce, and leave more immature animals, defining the species' life cycle.

LIMITING FACTOR—Anything that controls the density of a population within its habitat. Factors include the quality and/or quantity of food, water, cover, predators, disease, and climate.

MAMMAL—Any vertebrate of the class *Mammalia* including humans. All members of this class have hair on their bodies and feed their young milk.

MARSH—A tract of low wetlands generally supporting cattails and other reeds, muskrats, mink, red-winged blackbirds, and a wide variety of other species.

MICROCLIMATE—The environmental conditions in a restricted area. A shady area of cottonwoods in the sunny prairie may create a microclimate.

MIGRATORY—Birds and other animals that make an annual trip to a different area. Distance may be long or short, depending on the species. Sandhill cranes migrate through Kansas on their way to Texas for the winter and Canada for the summer.

MIMICRY—The close external resemblance of an animal to another animal or its surrounding. Often serves as protection or concealment. Imitate; simulate.

MOLLUSK—Any invertebrate of the phylum *Mollusca* comprising the chitons, snails, bivalves, squids, octopuses, etc. Typically have a hard shell.

MOLT—To shed worn feathers or skin so they can be replaced, or to lose one seasonal coat so it can be replaced by another.

MONOCULTURE—Vegetation of a single species, generally even-aged. This situation allows for little wildlife diversity and is potentially dangerous because it is more susceptible to disease.

MORTALITY RATE—The relative frequency of death in a community.

MUTUALISM—A close association between two different species whereby each species gains some benefit.

NATALITY RATE—Rate of birth.

NATIVE SPECIES—An animal or plant indigenous to a particular region.

NATURAL SELECTION—Process resulting in the survival and perpetuation of only those forms of plant and animal life that are able to adapt to the environment.

NOCTURNAL—Active at night; opposite of diurnal.

NONGAME—Animals that are not hunted, fished, or trapped; this includes the threatened and endangered species, song birds, etc.

NONRENEWABLE RESOURCES—Resources, such as soil and minerals, which cannot be regenerated by themselves.

OMNIVORE—Animal that eats both plants and animals.

ORGANISM—A form of life composed of mutually dependent parts that maintain various vital processes; any form of plant or animal.

PARASITE—An animal or plant that lives on or in an organism of another species from whose body it obtains nourishment.

PESTICIDE—Chemical preparation used to control populations of organisms.

PHOTOSYNTHESIS—The process by which green plants convert carbon dioxide and water into simple sugar. Chlorophyll and sunlight are essential to the series of complex chemical reactions involved.

PHYLUM—The major subdivision of the animal kingdom, consisting of one or more related classes.

PITTMAN-ROBERTSON FEDERAL AID IN WILDLIFE RESTORATION ACT—Funds gathered from an excise tax on sporting arms and ammunition for wildlife management and research use. A cost-sharing program of the federal government with the states.

PLANKTON—Organisms (usually microscopic) suspended in aquatic habitat. Includes bacteria, algae, protozoans, rotifers, etc. Phytoplankton are the plant plankton; zooplankton are the animal species.

POLLUTION—Harmful substances deposited in the air, water, or land which lead to a state of impurity and, often, unhealthiness.

POPULATION—All the individuals of a particular species in a given area.

PREDATOR—An animal that hunts other animals for its food.

PRESCRIBED BURNING—Planned application of fire to a predetermined area. A technique used in wildlife management to gain regrowth of certain vegetation.

PREY—Animals that are hunted for food by other animals.

PRODUCER—Organisms eaten by consumers. Green plants are primary producers; they are able to make food from sunlight and organic substances.

PRONGHORN—The proper name for the American antelope, *Antilocapra americanus.* Not a true antelope; does not have true horns. Pronghorns belong to a family by themselves. They are not found outside of North America.

RANGE—(a) Home range: the geographic area in which an individual animal resides. (b) an area grazed by livestock and/or wildlife. (c) all lands including forest land that produce native forage, in contrast to land cultivated for agricultural crops or carrying a dense forest.

RAPTOR—Bird of prey, such as eagles, hawks, and owls. Predatory birds.

RECYCLING—The salvage and reprocessing of used materials, such as paper, glass, and aluminum.

REFORESTATION—The replanting of trees in forests that have been affected by cutting, fire, disease, etc.

REFUGE—A wildlife sanctuary. National wildlife refuges are located across the United States. Kirwin, Quivira, and Flint Hills NWR are in Kansas.

REINTRODUCTION OF SPECIES—A wildlife management technique in which a species is reintroduced into its historic range, replanted in areas where it was extirpated.

RENEWABLE RESOURCES—Resources, such as trees and wildlife, that renew themselves naturally.

REPTILE—Any cold-blooded, scaled vertebrate of the class *Reptilia*, including turtles, lizards, snakes, and crocodiles.

RESERVOIR—A place where water is collected and stored for use. Kansas has approximately 25 reservoirs, such as Cheney, Wilson, and Clinton.

RESIDENT WILDLIFE—Animals that are residents of a specific area on a year-round basis, as opposed to migratory.

RIPARIAN—Dwelling on the bank of a river or other body of water. Riparian habitat is situated along a river.

RIPRAP—A quantity of stone placed in water for fish cover, and to prevent bank erosion.

ROADSIDE DITCH—Areas bordering roads; can be excellent for wildlife habitat if they are left to grow and have diverse vegetation. Too often, these areas are mowed and their use to wildlife reduced or removed.

RODENT—A gnawing or nibbling mammal, including mice, squirrels, and rabbits. Animals in the order *Rodentia*.

SACS—The baglike structure in an animal or plant. The prairie chicken has orange sacs on the sides of its neck.

SCAVENGER—An animal that eats the dead remains and wastes of other animals and plants. Dermestid beetles are scavengers.

SEASON (OPEN SEASON)—In wildlife terminology, season refers to a time when hunting and fishing is permitted for a particular species. May be a few days or year-round.

SEDGE—A rush or grass-like plant growing in wet places; sawlike edge to blade of plant.

SHELTER—Cover; cover from elements for raising young, to travel in, for breeding, sleeping, etc. Varies by species.

SHELTERBELT—Rows of trees and shrubs generally on the north and west sides of farms, homes, or fields; protects from weather and provides wildlife habitat.

SKINK—Any of a family of small, smooth-scaled lizards.

SLOUGH—An inlet from a river; backwater; tide flat, a creek in a marsh.

SMALL GAME—A hunting term designating smaller hunted species, such as rabbits, squirrels, quail, etc. Compare with "big game."

SPECIES—A group of individuals that resemble one another and are able to breed among themselves but not able to breed with members of another species. A category of biological classification immediately below the genus or subgenus. Species is both singular and plural.

STEWARDSHIP—The concept of land responsibility--that we do not own land but are managers of the resource and responsible to future generations for the condition of the land when we leave it.

STRESS—Usually thought of as a physical factor that applies to detrimental pressure to an organism or population. A drought might stress an animal population possibly resulting in inhibited reproduction.

SUCCESSION—The orderly, gradual, and continuous replacement of one plant or animal by another. A bare field will gradually develop into a woodland if not disturbed by fire, mowing, etc.

SURPLUS—That quantity of wildlife above the carrying capacity. The surplus is removed by disease, starvation, hunting, or predation.

TALON—A claw from a bird of prey.

TERRITORY—An area defended by an animal against others of the same species. Used for breeding, feeding, or both. Wolves are territorial.

THREATENED—Species of plants and animals that are protected by law and are limited in number or range or both. May become endangered if reduction continues.

UNGULATE—A hoofed mammal.

UNITED STATES FISH AND WILDLIFE SERVICE—The federal organization responsible for wildlife on the national level. This organization sets standards and gives guidance to the state wildlife agencies.

UPLAND—The higher ground of a region; above the level where water flows. Upland game animals include prairie chicken, turkey, pheasant, quail, etc.

VERTEBRATES—Animals with backbones.

WARM-BLOODED—Animals that are able to maintain a fairly constant body temperature independent of their environments, as opposed to cold-blooded animals.

WATERFOWL—Water birds; usually ducks and geese but may be used in referring to shore birds and wading birds as well.

WILDFIRE—Any fire other than a controlled or prescribed burn occurring on wild land.

WILDERNESS AREA—An area established by the federal government to conserve its primeval character and influence for public enjoyment under primitive conditions in perpetuity.

WILDLIFE—All wild, living animals. Includes birds, fish, mammals, reptiles, amphibians, insects, mollusks, crustaceans, etc. Occasionally, the term is even applied to plants. Game and nongame animals are wildlife.

WILDLIFE MANAGEMENT—An effort based on the science of ecology and designed to maintain wildlife at certain population levels. This effort entails habitat manipulation and an understanding of wildlife population dynamics, diseases, behavior, and reproduction. This is done by wildlife managers working for the Fish and Game Commission and by other interested individuals and groups.

WILDLIFE RESEARCH—Investigating wildlife to gain information that can be used to better manage wildlife. Examples of projects might include taking a survey or census of populations, gathering and analyzing data about animal behavior, and studying and comparing the interaction of wildlife within habitats.

ZOOLOGY—The study of animals; a branch of biology.

This program was funded from hunting and fishing license fees and partially by the Nongame Wildlife Tax Check-Off Program.

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EQUAL OPPORTUNITY EMPLOYER

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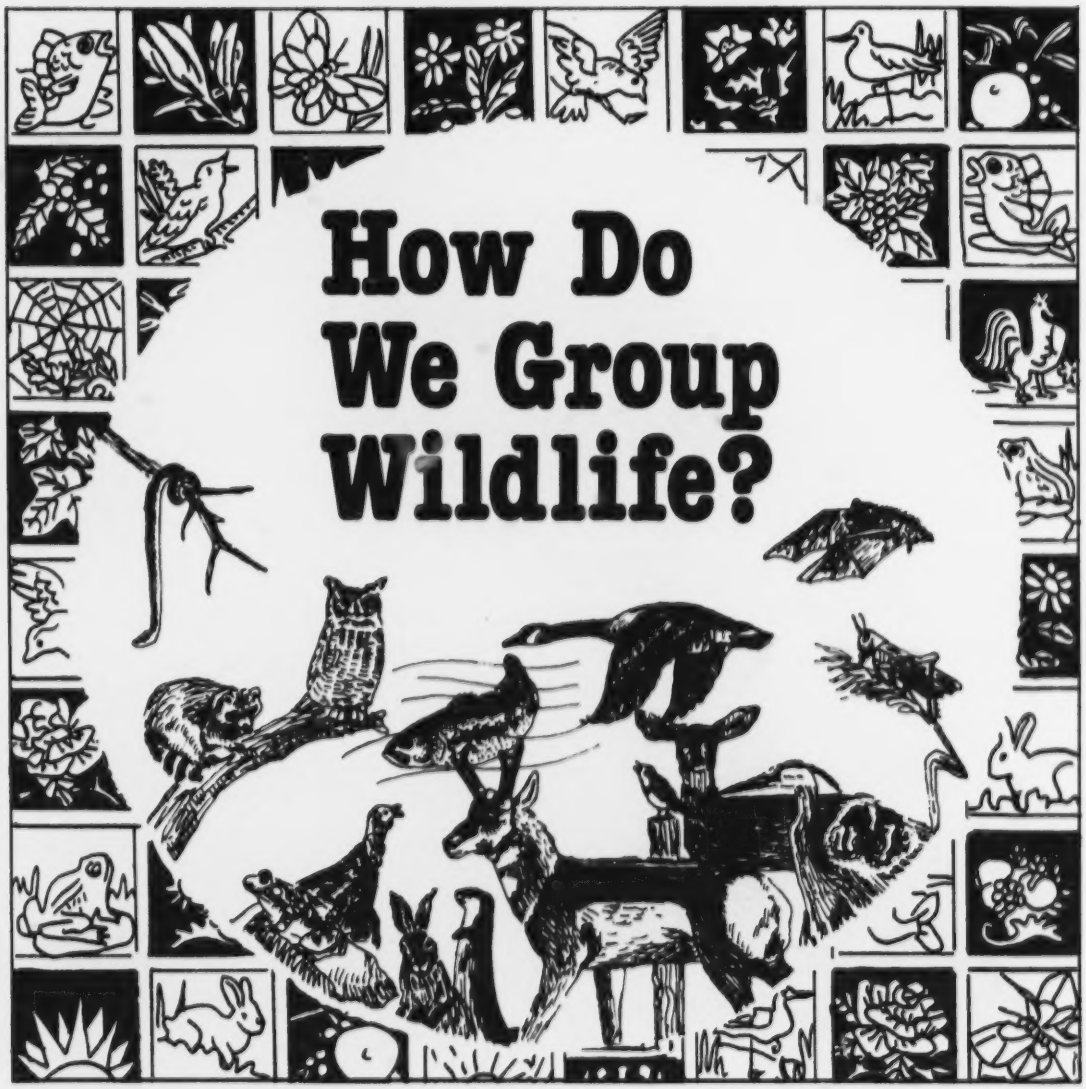
KANSAS FISH AND GAME



Student Manual

wildlife
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KANSAS FISH AND GAME

NONCONSUMABLE

5

Comprehensive program written and developed by
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wildlife education service
KANSAS FISH AND GAME

Wildlife Education Service
A series of wildlife education materials for Kansas youth
from the Kansas Fish & Game Commission

The elementary series includes:

Preschool-Kindergarten	WILDLIFE IS BASIC
1st grade	WILDLIFE AND ME
2nd grade	FOOD FOR WILDLIFE
3rd grade	WILDLIFE NEEDS A PLACE TO LIVE
4th grade	ENDANGERED, OR ALIVE AND WELL LIVING IN KANSAS
5th grade	HOW DO WE GROUP WILDLIFE
6th grade	HOME IS WHERE THE HABITAT IS

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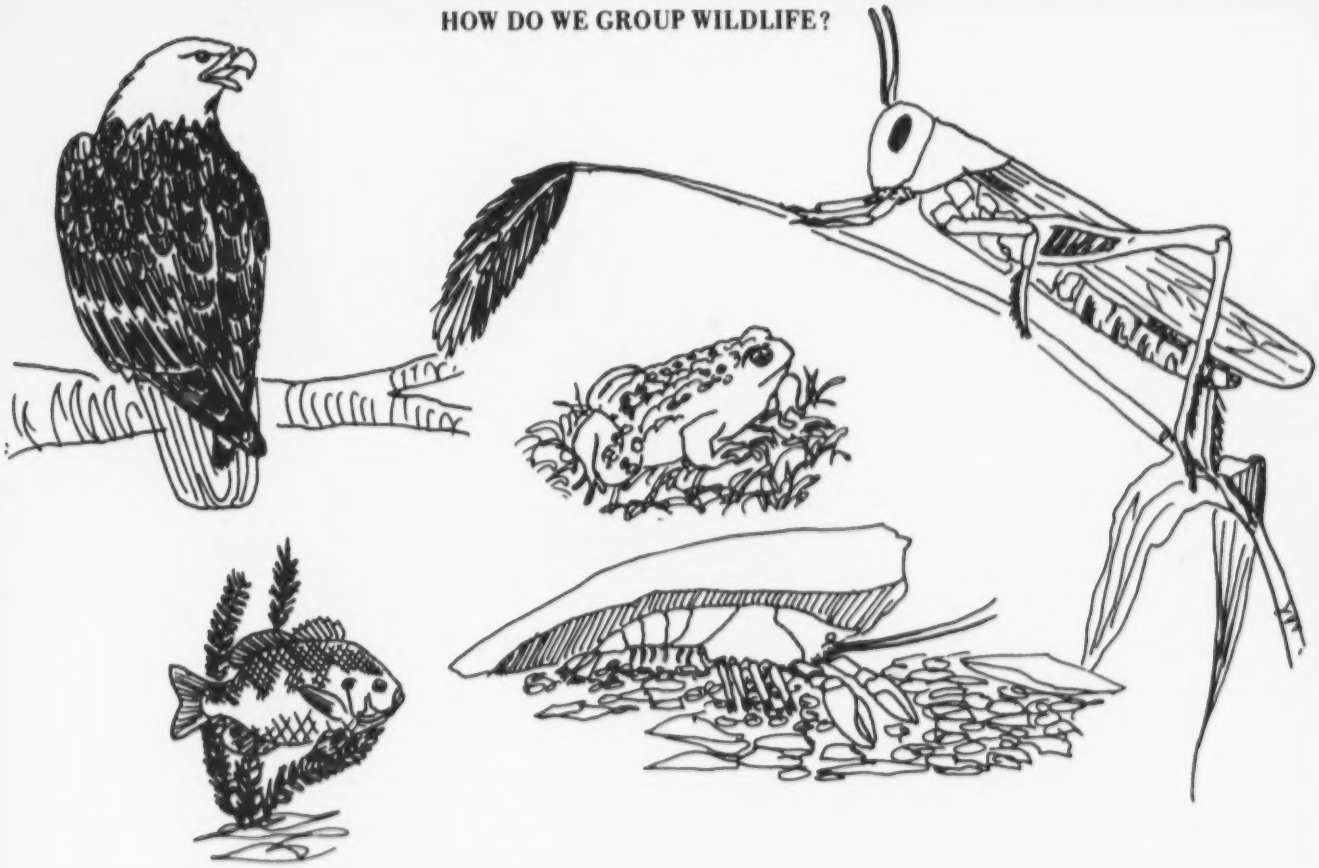
HOW DO WE GROUP WILDLIFE?

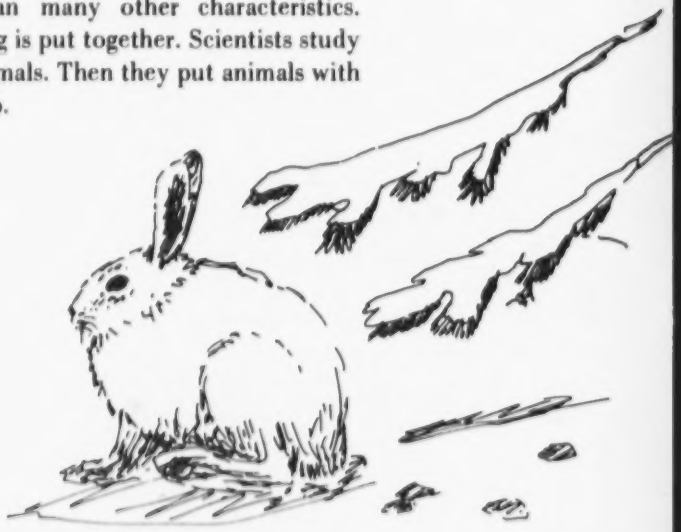


Grasshoppers, rabbits, lizards, crayfish, eagles, bluegills, toads. All are animals alike in some ways, different in others. There are billions of **species**, or kinds of animals, in the world. Insects alone number around 900,000 species, and scientists estimate that there are 600,000 more to discover. There are 23,000 fish, 8,900 birds, 7,000 mammals, 2,500 amphibians, and 6,500 reptile species in the world, and several additional groups of animals, too. The numbers are so large that it is impossible for anyone to count all the different species. So how do we manage to study such a huge and diverse group?

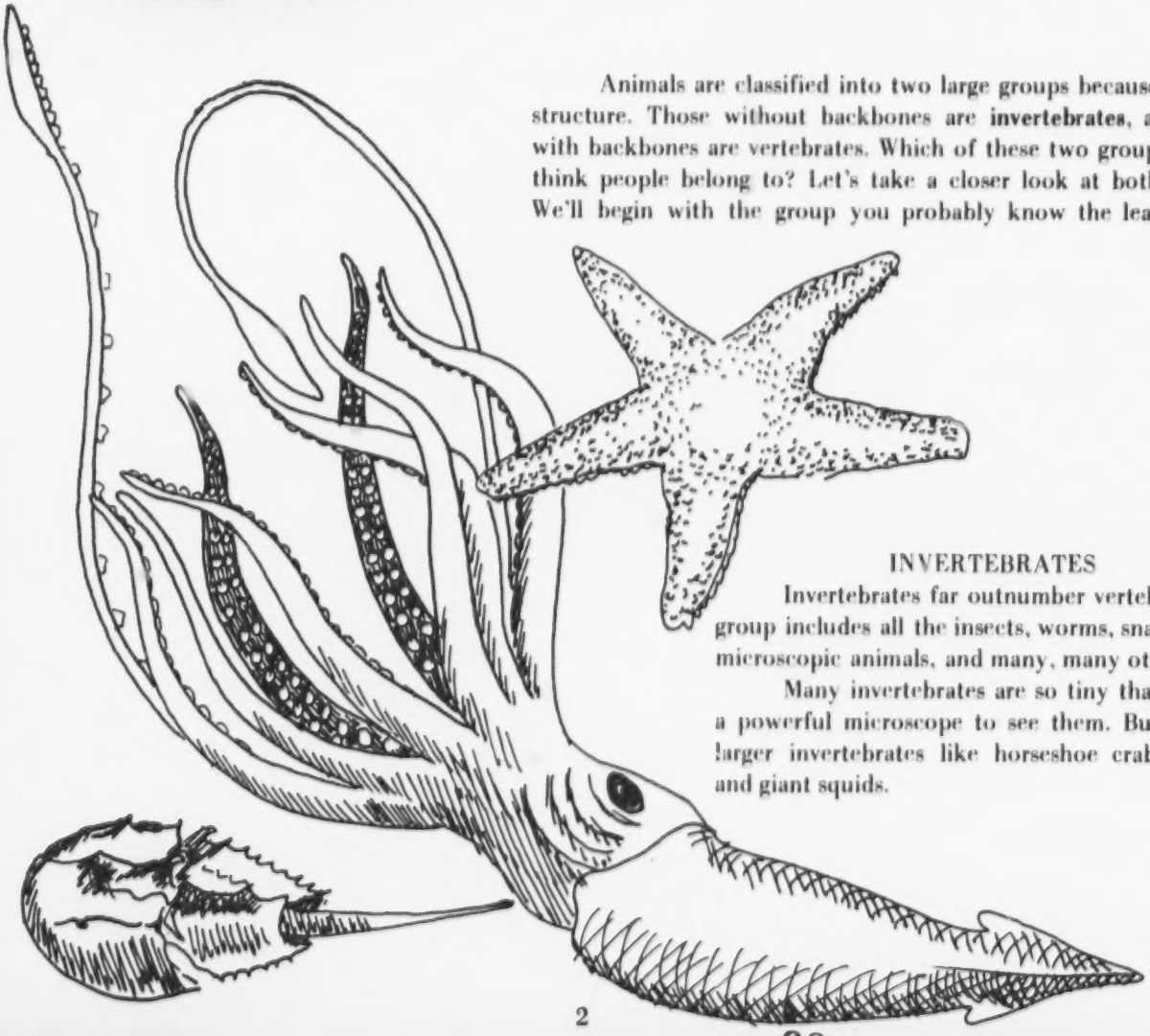
Through **classification**. Scientists have been investigating animals for centuries and grouping (or classifying) them by characteristics such as size, color, structure, locomotion, and diet. Classification makes it easier for us to learn about the billions of animals we share the world with.

If you hold a garter snake in one hand and a worm in the other, you can **observe** two animals that are alike yet different. Think about what you know of these two animals and list two or three ways they are alike and different. Your list of how they are alike might indicate that they both move without legs; they have skin to cover and protect them; they can be found in your lawn or garden; and they both need food, water and shelter to live. When you listed their differences, you might have noticed they weren't the same size or color. They also don't eat the same food, and they find it in different ways, too. If you'd x-ray them, you'd see that the snake has a skeleton, but the worm doesn't have a single bone. For two animals that seemed so similar, they really are quite different.

As the worm and snake showed us, appearance is not always a dependable guide for classification. An adult worm may be larger than a young snake. A snowshoe hare is brown in the summer and white in the winter. But it is always a snowshoe hare. Because of these external changes, it is safer to classify by structure because structure is less changeable than many other characteristics. **Structure** means the way something is put together. Scientists study and compare the structures of animals. Then they put animals with similar structures in the same group.



Animals are classified into two large groups because of their structure. Those without backbones are **invertebrates**, and those with backbones are vertebrates. Which of these two groups do you think people belong to? Let's take a closer look at both groups. We'll begin with the group you probably know the least about.

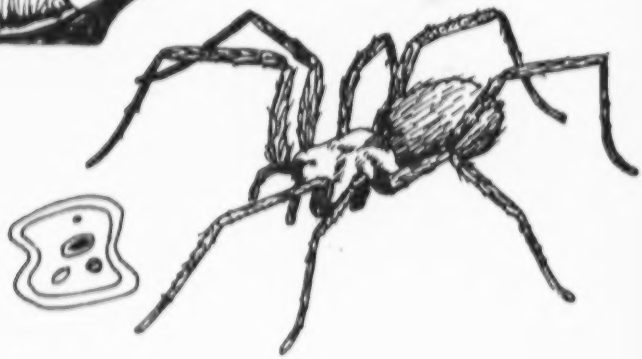


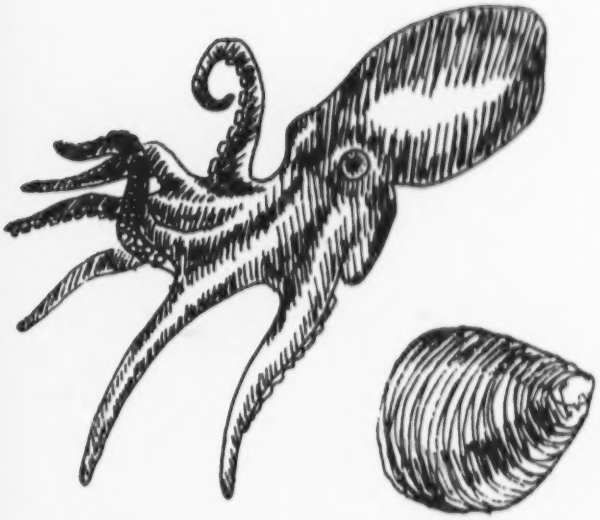
INVERTEBRATES

Invertebrates far outnumber vertebrates. This group includes all the insects, worms, snails, spiders, microscopic animals, and many, many other species.

Many invertebrates are so tiny that you need a powerful microscope to see them. But there are larger invertebrates like horseshoe crabs, starfish, and giant squids.

Among the smallest of invertebrates are **protozoans**. Only one cell in size, these creatures nonetheless have everything they need to live in that one cell. Every natural body of water has protozoans in it. We can see only a few of them without using a microscope. Protozoans eat bacteria or smaller protozoans for food and they become food for larger animals. Certain protozoans in blood cause diseases like malaria and African sleeping sickness. Other protozoans live in the intestines or stomachs of animals and help them digest their food.



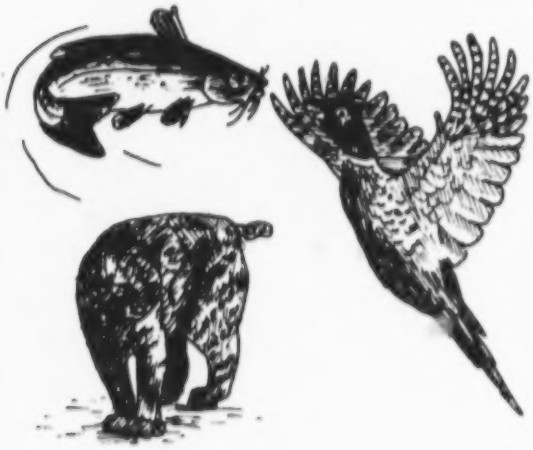


Some of the many-celled invertebrates, such as worms, mollusks, and arthropods, can be found around your home and school. **Mollusks** include snails, clams, mussels, oysters, squids, slugs, and octopuses. Several of the animals in this group are covered with a shell for protection.

Arthropods have jointed legs and a tough outer covering called an **exoskeleton**. This large group includes insects, spiders, and crustaceans. Insects are the most common arthropod. They have three pairs of legs and a body that is divided into three parts. Spiders have four pairs of legs and two body parts. **Crustaceans** have hard shells. Crayfish, crabs, lobsters, and shrimp belong in that group.

VERTEBRATES

You may know more about vertebrates because you are one. Your backbone, made up of many bones called **vertebrae**, helps support the rest of your body and protects your spinal cord. Slide your fingers down the center of your neck. You should feel a hard ridge of bones – your vertebrae. The vertebrae are connected to each other by **ligaments** that bend or flex.



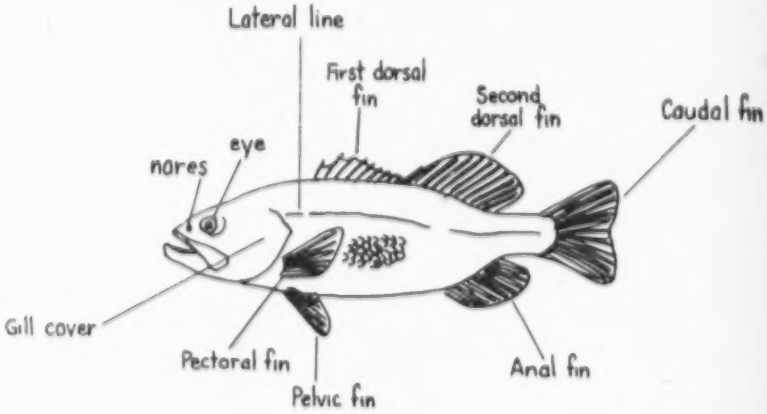
The body of most vertebrates is made up of a head and trunk. Limbs are attached to the trunk. Most vertebrates have two pairs of limbs. Birds have wings and legs; fish have fins; bobcats have front and back legs. Limbs are **adapted** for the animal's environment. Fish use their fins for swimming; birds and bats use their wings for flying; bobcats use their legs for walking and running.

Differences in **locomotion** (the way a creature moves) are helpful in classifying animals. But other differences are also used to define five **classes**, or groups, of vertebrates: fish, amphibians, reptiles, birds, and mammals. Fish are the simplest vertebrates; mammals are the most complex.

FISH

Fish can be easily distinguished from other vertebrates. Their **habitat**, or where they live, is your first clue. Fish are adapted to life in water and their bodies are **streamlined** for swimming. All fish have fins and gills. The fins, of course, are for moving, and the gills for breathing. Fish take water into their mouths and pump it through gills, special body organs that take air from the water as it passes over them. Gills are a fish's lungs.

In addition to breathing with gills, fish are **cold-blooded**. Their body temperature is about the same as the water they live in. The next time you go fishing, touch a fish right after you catch it; then touch the water and notice how they are the same temperature.

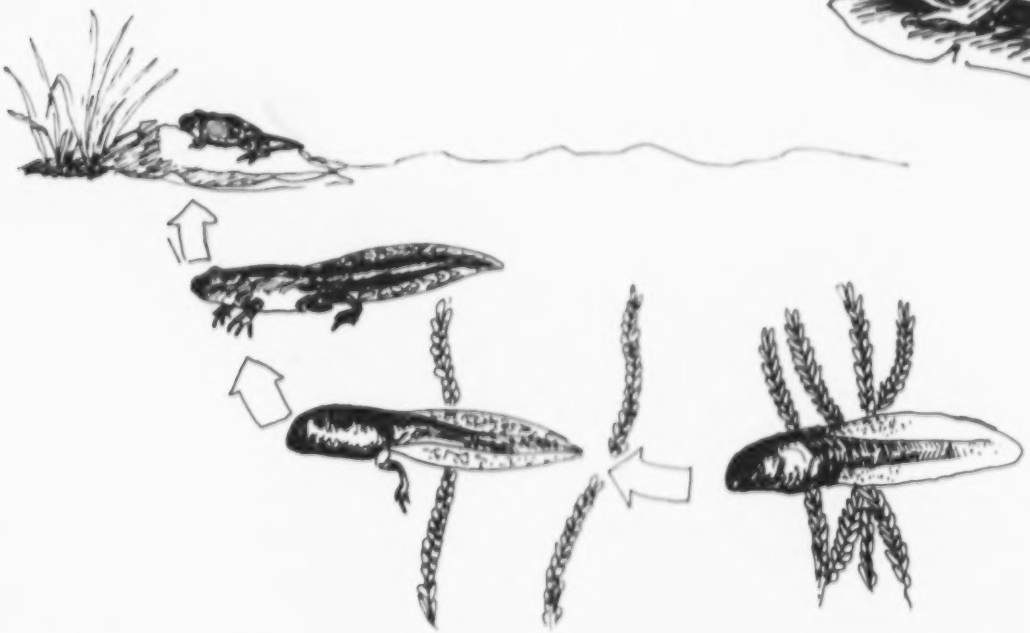


Most fish have scales covering their bodies. A few, like catfish, have smooth skin. Some fish lay eggs, while others hatch their eggs in their bodies and give birth to live young. Have you ever seen guppies born?

AMPHIBIANS

Though toads, frogs, and salamanders have much in common with fish, they belong to another class of vertebrates called amphibians. Amphibians are adapted to life in water, but they spend some of their time on land, too.

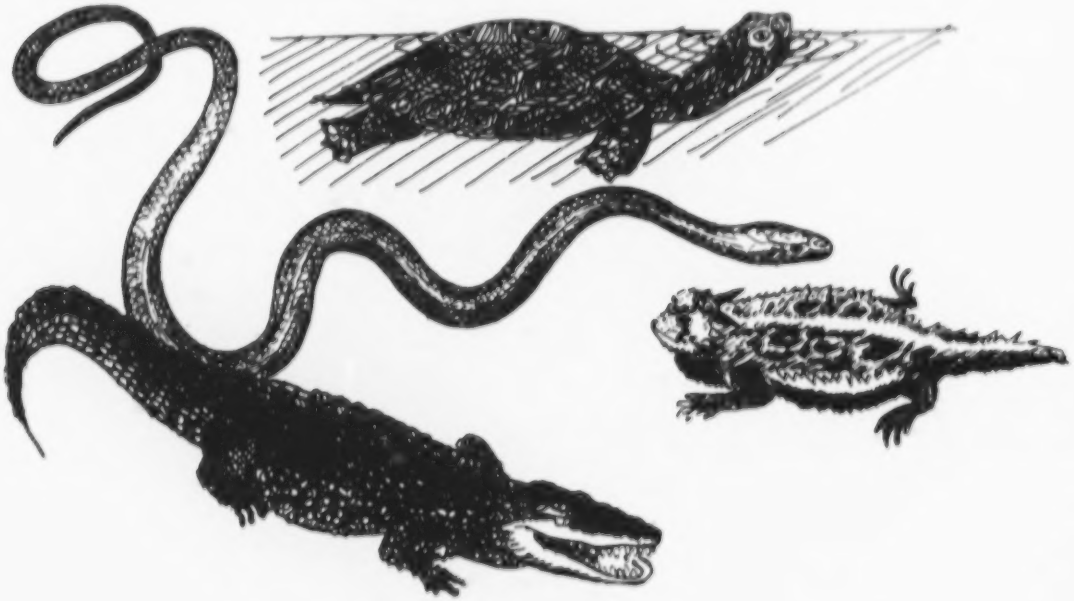
The common bullfrog is an excellent example of an amphibian that starts life as a small, jelly-like egg under water. When the egg hatches, the frog emerges as a tadpole with gills and a long, fishy tail. As this **larval** stage of the bullfrog grows, it sprouts the legs of an adult frog, and also develops lungs. At the same time, its tail and gills gradually disappear. It lives the rest of its life near water, which it needs to keep its smooth skin moist.



Like fish, amphibians are cold-blooded. To avoid freezing, they spend the winter buried in mud below the frost line of ponds, lakes, reservoirs, and streams. When they **hibernate**, their body activities slow down. Hibernating animals adjust to the cold by using less energy and oxygen. When the temperatures rise in the spring, they become active again.

REPTILES

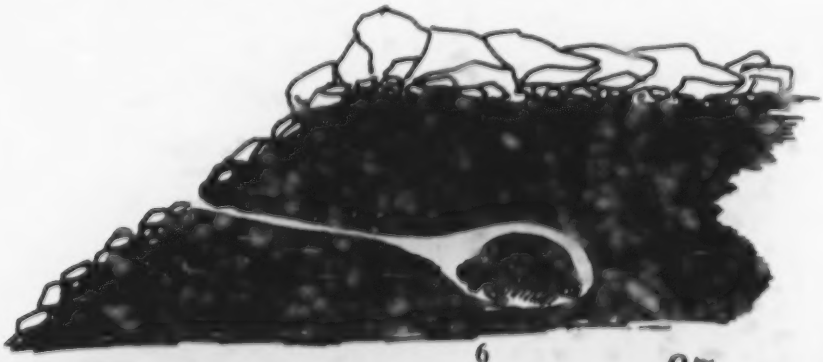
Reptiles are quite different from amphibians. They are covered with scales or shells instead of the moist skin of amphibians. Turtles, snakes, lizards, alligators, and crocodiles, are all reptiles. Only turtles, snakes, and lizards are found naturally in Kansas. Reptiles usually live on land, but some turtles spend much of their time in water. This group is able to be further away from water because their skin protects them from drying out quickly. All reptiles breathe with lungs. Those reptiles that spend time in water must come to the surface to breathe.



Reptiles with feet have claws on their toes. Snakes and some lizards do not have legs. They move by catching the scales on the underside of their body against the ground. The muscles attached to the scales and ribs move, and the rest of the body follows. (Lie on your stomach and, without the use of your arms or legs, try to move like a snake!)

Many reptiles hatch from eggs layed on land. Some lizards and snakes, like the garter snake, give birth to live young. Young reptiles look like their parents, only smaller.

The body temperature of reptiles changes with the surrounding temperature. Like the cold-blooded fish and amphibians, reptiles must spend Kansas winters hibernating below ground or water so they don't freeze. On some of those bitter cold, windy days, don't you wish you could hibernate inside your house?

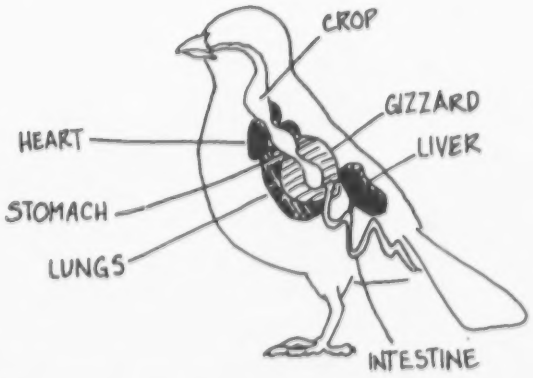


BIRDS

Birds are easy to tell apart from other animal groups because they are the only animals with feathers. Feathers cover birds and protect them from heat and cold. New feathers replace old, worn feathers in a process called **molting**. With feathers and wings, most birds are able to fly. A few birds, like penguins, waddle instead of fly.

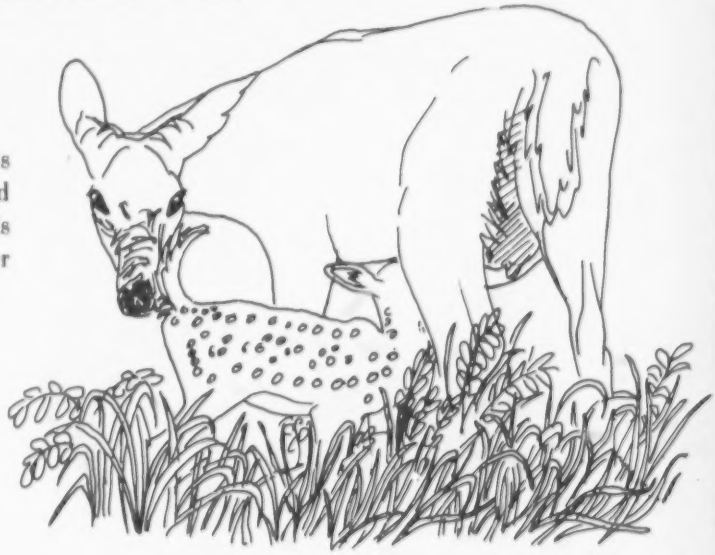
All birds have hard mouth parts called beaks or bills that help them get food. The shape and size of the beak depends on what the bird eats and how it gets its food. Seed-eaters require a different kind of beak than meat-eaters. Birds stay busy searching for the food they need for energy. Some birds eat half their weight in food each day, and baby birds eat more than their weight in food each day. So if someone tells you that you eat like a bird, you must have a really big appetite!

Birds are like reptiles because they breathe through lungs and are hatched from eggs with hard shells. However, birds are **warm-blooded**. That means their body is always about the same temperature. Warm-blooded animals make body heat by staying active. The temperature of a bird's body is around 40 to 44 degrees Celsius (104 to 109 degrees Fahrenheit). This is warmer than your average body temperature by about 7 degrees.

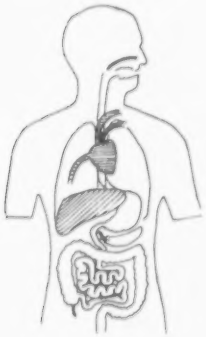


MAMMALS

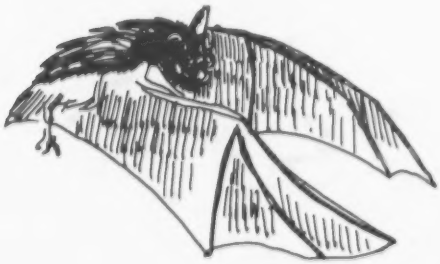
The last group of vertebrates is the one people belong to. Mammals are more complex than the other vertebrates. You can tell mammals apart from other vertebrates by the hair on their bodies. All mammals have some amount of hair, although it may not be very noticeable in mammals like whales. Mammals like foxes have thick fur, while others, like pigs, have stiff bristles. Whether the texture of the hair is soft or coarse, it serves to protect the animal from its **environment**. Mammals **molt**, or shed, replacing their hair from time to time.



Mammals get their name from special glands that produce milk for their young. These are called **mammary glands**. Mammals are the only animals that produce milk. As young mammals grow older they are able to feed themselves.



Mammals breathe through a mouth and nose and into lungs. They are well adapted for life on land, but may also be good swimmers. A few, such as bats and flying squirrels, can fly or glide.



Mammals generally have well-developed teeth to handle large amounts of food. Like birds, all mammals are warm-blooded, maintaining a fairly constant body temperature. The hair on their bodies helps hold in heat.

In comparison to other animals, mammals have large brains for their body size. Brains give mammals the greatest capacity for learning. Humans have the most complex brains. We are able to learn things like reading and writing. Because of our special abilities, we should make wise decisions about the environment and the other creatures in it.

Review

–Animals are divided into two groups: invertebrates and vertebrates.

–Invertebrates do not have backbones. Vertebrates have backbones.

–Invertebrates include protozoans, worms, arthropods, mollusks, and starfish.

–There are five groups, or classes, of vertebrates: fish, amphibians, reptiles, birds, and mammals.

–Fish are the least complex vertebrates. They breathe through gills, live in water, are cold-blooded and have fins.

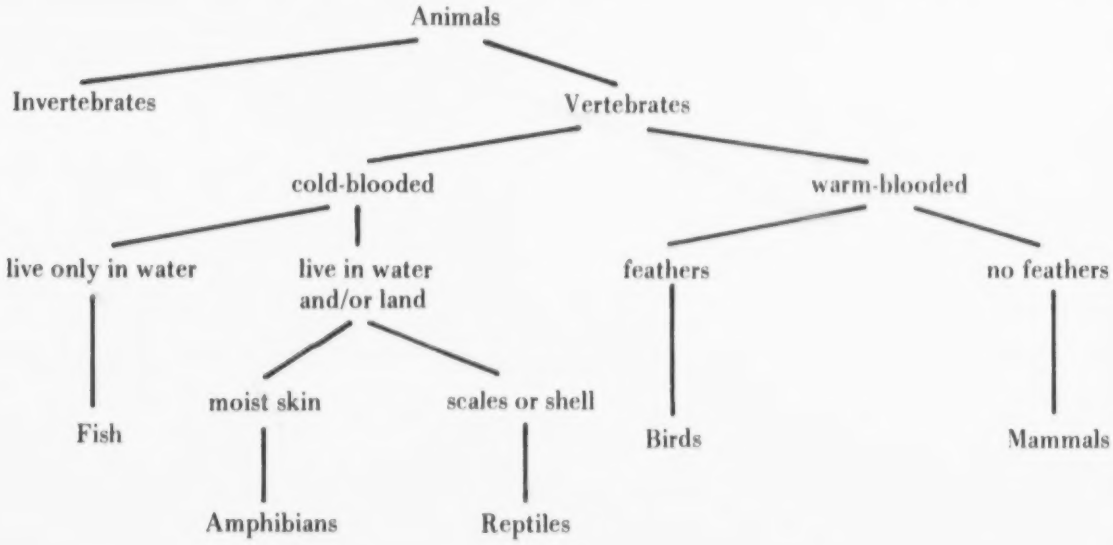
–Amphibians have moist skin, breathe from gills when young, develop lungs as adults, and are cold-blooded.

–Reptiles have lungs; they are cold-blooded, and scales or shells cover their bodies.

–Birds have feathers , wings, beaks or bills; they are warm-blooded and breathe through lungs.

–Mammals have hair, feed their young milk, are warm-blooded, and are the most complex of the vertebrates.

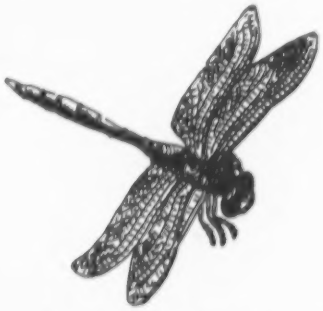
Scientists use keys to identify animals. **Keys** divide animals by characteristics. Follow the key of the animals below, then see if you can make your own key.



OTHER WAYS TO CLASSIFY

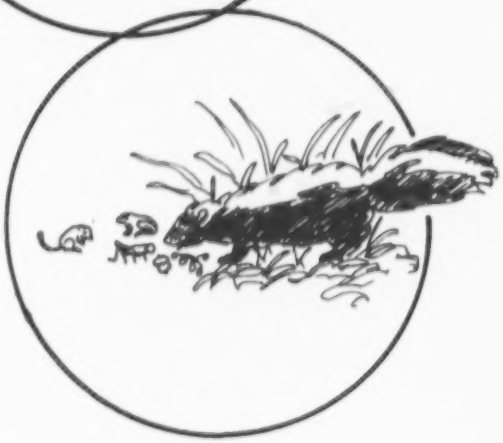
Animals can be classified by their behavior as well as by their physical characteristics. **Behavior** refers to what animals do and how they do it.

You have already learned about animals that hibernate during cold winters. Amphibians, reptiles, and some mammals are good examples of hibernators. Animals that live in places where the summer is very warm may estivate. **Estivation** means the animals spend the hot summer days resting to save their energy.



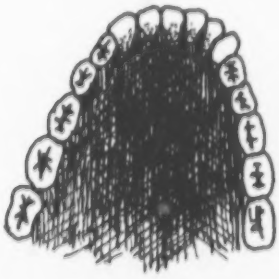
Other animals respond to seasonal changes by migrating. **Migration** is the annual travel from feeding areas to breeding areas. We usually think of birds migrating south for the winter and returning north for the summer. But other animals – like Monarch butterflies, green darners, and some snakes and turtles – migrate too. The distances and direction of migration may vary, but the reasons are similar. Birds are often classed as migratory or non-migratory.

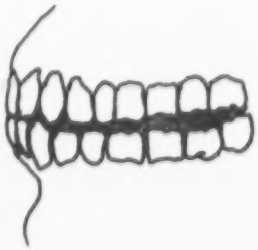
Day-to-day schedules for animals also differ. Most species that we are familiar with are active during the day, or are **diurnal**. Animals that are active at night are **nocturnal**. Raccoons, brown recluse spiders, fire flies, owls, and bats are all nocturnal animals. Nocturnal animals can hunt for food without being easily seen. They must be able to move around in the dark. Many nocturnal animals have excellent night vision, but bats use a special radar called **echolocation**. They bounce sound waves off objects to find their way around and to locate food.



Since eating is so important for the survival of animals, there are special categories that refer to what an animal eats. Animals like rabbits eat only plants. They are called **herbivores**. Meat-eaters like foxes are called **carnivores**. Animals like skunks, that eat both plants and meat, are called **omnivores**.

Meat-eaters need sharp, pointed teeth for ripping and tearing their food. Plant-eaters have broad, flat teeth for grinding. Compare the deer skull with the fox skull. Which animal eats plants and which one feeds on meat? Omnivores have a combination of flat and pointed teeth.





Check your teeth. The sharp ones are **canines** and the flat ones in the back are **molars**. Your front teeth are called **incisors**. What special task does each tooth accomplish?

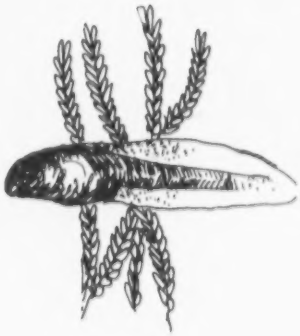
Plants are called **producers** because they produce food by using the sun's energy. Animals that eat plants and/or meat are consuming food. They are called **consumers**. Predators are a kind of consumer that kill and eat other consumers. Animals that live off other living animals (leeches, fleas, tapeworms) are called **parasites**. Animals,like carrion beetles and maggots,help break down dead and decaying things. These creatures are **decomposers**. Nothing natural ever really comes to an end when there are producers, consumers, and decomposers around. There's a natural cycle – fertile soil grows plants (producers); consumers eat producers; predators eat consumers; and decomposers break down the dead material to fertilize the soil.

If using characteristics and behaviors of an animal doesn't give you enough clues to classify it, try using the animal's habitat. Where an animal lives can tell you a great deal about how it is adapted for survival. There are water and land animals, and these can be further organized into fresh or salt water, desert, mountain, polar, prairie, marsh, and tropical creatures. With all of these ways to classify animals, we shouldn't have too much trouble putting animals into several groups. We might describe an animal as being a warm-blooded vertebrate, two-legged mammal, omnivore, diurnal, and an intelligent consumer. What animal fits this description?

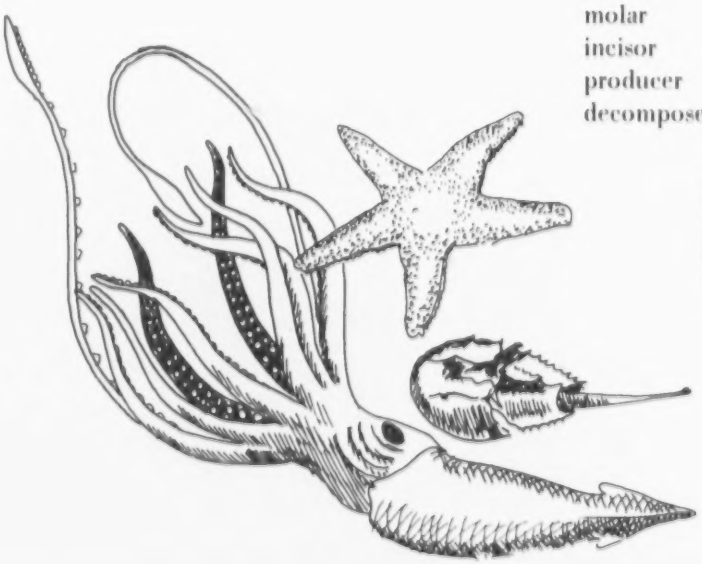
VOCABULARY

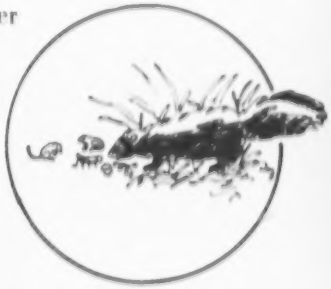
Now that you've read "How Do We Group Wildlife?", see if you know what these words mean. Look up words you're not sure of. Go outside and see if you can find examples of several of these.

species (both singular and plural)
estimate
fish
amphibian
reptile
bird
mammal
diverse
classification
investigate
observe
characteristic
similar
locomotion
structure
invertebrate
vertebrate
vertebrae
ligament
protozoan
mollusk
arthropod
exoskeleton
crustacean
adapt
parasite
consumer
larva



class
identify
habitat
streamlined
cold-blooded
warm-blooded
hibernate
molt
environment
mammary gland
key
behavior
category
estivation
migration
song bird
diurnal
nocturnal
echolocation
herbivore
carnivore
omnivore
canine
molar
incisor
producer
decomposer





This program was funded from hunting and fishing license fees and partially by the Nongame Wildlife Tax Check-Off Program.

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